

THE MEDICAL NEWS.

A WEEKLY JOURNAL OF MEDICAL SCIENCE.

VOL. LIII.

SATURDAY, AUGUST 4, 1888.

No. 5.

ORIGINAL LECTURES.

THE CEREBRAL PALSIES OF CHILDREN.

Clinical Lectures delivered at the Infirmary for Nervous Diseases.

BY WILLIAM OSLER, M.D..

PROFESSOR OF CLINICAL MEDICINE IN THE UNIVERSITY OF PENNSYLVANIA, PHYSICIAN TO THE PHILADELPHIA AND UNIVERSITY HOSPITALS AND TO THE INFIRMARY FOR NERVOUS DISEASES.

LECTURE IV.

SPASTIC PARAPLEGIA.

SYNONYMS.—Paraplegia cerebialis spastica (Heine). Tetanoid pseudo-paraplegia (Seguin). Spastic spinal paralysis (Erb). Tabes dorsalis spasmodique (Charcot).

Spastic paralysis of the legs is a common affection, and yet it is only within the past few years that the subject has attracted much attention from writers on diseases of the nervous system. The orthopædic surgeons have for years past described and figured cases of this sort in children, which in reality form no inconsiderable quota of the patients at their clinics. Heine, as early as in 1840, gave an admirable account of it and expresses the modern conception of the disease in the name which he applies—*paraplegia spastica cerebialis*. Delpech, Stromeyer, Adams and more particularly Little, describe it in their works already referred to. Erb¹ and Seeligmüller,² in Germany, and Gee,³ in London, brought the subject to the notice of physicians, and the former author described the cases with those of spastic paraplegia of adults. Ross,⁴ Hadden,⁵ Gowers,⁶ d'Heilly⁷ and Gilbert⁸ have more recently dealt with the question, and the disease is now usually assigned a place among the cerebral palsies of children.

SYMPTOMS.—The general features of the disease may be thus defined: Spastic paralysis of the lower extremities dating from birth, or coming on within the first years of life; absence of wasting; a condition of talipes equinus or equino-varus; adductor spasm, producing the "clasp-knife rigidity;" the gait stiff, the patient walking on the toes, or there may be cross-legged progression. The intellect is usually impaired, though not so profoundly affected as in bilateral hemiplegia.

Case I.—Samuel B., æt. fourteen years. Parents alive and healthy. Three other children, one died of cholera

infantum. Born at term, instruments not used, labor easy. "Nervous" at birth. At about nine months began to cry out at nights and would draw up both feet as if in great pain. Never stood alone or walked. Now with assistance can walk a little. Cannot read; mother says he can sing. Cannot speak at all distinctly; voice very thick. Sits bent over double, head hanging on chest; cannot sit upright for more than a moment. Moves head and body constantly. Knee-jerk marked. Ankles, knees and hips stiff. Feet turned out at ankle, knock-knee. In walking, puts toe to ground first. Pupils equal. Expression idiotic. Neck large, circumference fourteen inches. Trapezius and sternocleidomuscles much enlarged. Tongue long. Teeth: two upper incisors a little chisel-shaped; lower teeth well formed. Head diameters: biparietal, five and one-quarter inches; occipito-frontal, six and one-half inches. Hands strong, well developed. Heels much drawn up. Can flex legs and feet. Ankle clonus present. Muscles of legs not so well developed as those of arms. Spine flexible, no scoliosis.

Case II.—Veria M., æt. thirteen years. Mother living, father killed. Five children living, four dead. Two born dead, one by craniotomy. This child born at eight months; no forceps; labor long and hard. Nursed at breast; spasms at four months and again at six. Never could walk alone until fourth or fifth year. *Present state*: Left leg twenty-four and one-half inches long. No ankle clonus. Right leg twenty-five and one-half inches long. Knee-jerk + +. Gait spastic; cannot walk without crutches. Patella drawn above condyles of femur by quadriceps extensor. Dentition tardy. Arms normal. Head: biparietal diameter, five and one-quarter inches; occipito-frontal, seven inches; circumference twenty and three-eighths inches. Bright, but queer.

Case III.—Addison D., æt. nine years. M. 5, 342. Deformity first noticed at fourteen months. Has never walked, sits doubled up with spine curved. Thighs look large, owing chiefly to large development of fat. Thigh can with difficulty be flexed on abdomen, pelvis rises on flexing thigh; knee very stiff, but can be gradually overcome. Legs much wasted; knee-jerk +. Toes are flexed and he cannot move them. Foot everted. Creeps about and walks with assistance on the outer side of his feet. Head well shaped: biparietal diameter six inches; occipito-frontal, seven inches; circumference twenty-one inches. Intelligence good, can read. Distinct nystagmus, convergent strabismus. Teeth well formed. Arms normal. Electrical examination: responds actively to faradization.

Case IV.—John P., æt. four years. I. P., 4, 4. Parents healthy. Had convulsions at ten months; paralysis of legs, which are rigid. Now creeps on knees, equinovarus of both legs; reflexes +.

Case V.—George N., æt. five and a half years. I. P., 4, 20. Natural labor, never had convulsions. Whooping-cough at four and a half years. Christmas, 1883,

¹ Erb: Virchow's Archiv, Bd. lxx.

² Seeligmüller: Jahrbuch für Kinderheilkunde, Bd. xiii.

³ Gee: St. Bartholomew's Hospital Reports, vol. xiii.

⁴ Ross: Brain, vol. v.

⁵ Hadden: Brain, vol. vi.

⁶ Diseases of the Nervous System, vol. i.

⁷ Revue men. des Maladies de l'enfance, 1883-84.

⁸ Revue médicale de la Suisse romande, 1887.

began to get restless and uneasy. Was treated for worms, and passed some. Then became weak in the legs. The right leg first became weak, then in January, 1884, the left. The weakness steadily increased. Now the legs are rigid; spastic contraction of muscles of feet; talipes equinus; walks on toes. Is bright. Reflexes increased. No special disease.

Case VI.—Robert G., æt. four years and nine months. M. 6, 48. Only child. Born with instruments, cried for eight hours steadily after birth. In twelve hours a large lump formed in left occipital region. This was lanced and a clot of blood removed. Intelligence good up to fifteenth month. At two years of age said to have had tubercular meningitis. Intelligence impaired ever since. Never had a convulsion. Has a depression at anterior fontanelle, which has a hard base. Says about a dozen words, not particularly fretful. Knee-jerk +. "Lead-pipe" leg; both legs nearly equal in stiffness; no wasting. Progresses by lifting his weight on his arms and throwing his body forward; cannot walk. Arms are strong. Nystagmus present. Phimosis. Teeth are in a state of decay and discoloration.

Case VII.—Frank W., æt. six years. M. 6, 100. A large baby, born with instruments, very long labor. Only child. Mother contracted syphilis six weeks before childbirth, and had a suppurating bubo. Began to walk at eighteen months, but never walked well, always stiffly. Teething a little tardy. Improved in walking till two years ago, when he had several spasms in rapid succession for twenty-four hours, which left him weak. The spasms came on in A.M. about 3 o'clock, did not gain consciousness until 5 P.M. Had much fever; was ill a week. Talked and walked more since the spasms. Has had slight spasms since. Last May had a series of very severe spasms. No stiffness in arms. Legs both spastic, toes turned in. Falls often. Has a very peculiar stiff gait, toes on ground; some incoördination in hands, particularly the left; picks up objects with difficulty; fingers very clumsy. Stiffness of legs most in extension. Feet extended. No nystagmus. Has headache at times. Knee-jerk + on both sides; no clonus. Slobbers a great deal. Does not talk well; says many words. A slight internal strabismus. Biparietal diameter, five and a quarter inches; occipito-frontal seven inches; circumference nineteen and seven-eighths inches.

Case VIII.—Stella H., æt. six years. I. P. B., 73. Never had fits; sickly from birth; no note as to labor. Had a fall at twenty-two months. *Status præsens*: Limbs well developed. At times limbs limber, but often rigid. Leg flexed, toes turned very much in. Can move legs, but cannot stand without assistance. After some effort rigidity is overcome. Arms normal. Electromuscular contractility normal.

Case IX.—Mamie McD., æt. three years and two months. M. 7, 75. Mother died of phthisis. Born at seven months, no instruments used, labor natural. Always weak; measles three months ago; very severe spasms and crying spells, unconscious fifteen to thirty minutes. Can stand alone for a minute; can walk when supported, cross-legged progression and walks on tiptoe. No special stiffness except when walking. Knee-jerk + +. No ankle-clonus. Ankles inverted; movements of hip-joints normal. Hands not affected. Has night terrors. Intelligence good. No nystagmus. After five months treatment much improved.

Case X.—Violet M., æt. one years and four months. I. P. 4, 46. First child in twenty-three years of married life. Two miscarriages. Labor natural and quick. Child weighed four pounds at three and a half weeks. Fed on bottle. Cholera infantum. No fever, no convulsions. The hands and arms are thin and never have developed well. Motion with them is very much impaired; difficulty in grasping or holding an object. Can walk with difficulty. Head brachycephalic. Intelligence poor. Knee-jerk +. February 15, 1888, is four years old. Has not been able to sit alone; cannot walk. Can say a few words, "papa" and "mamma"; understands everything; looks bright; has intelligent smile. Bad tempered; cries a good deal; dribbles much. Head: bi-parietal diameter, five inches; occipito-frontal, five and three-quarters inches; circumference, seventeen and three-quarters inches. No squint; no nystagmus. Teeth decayed. Had a convulsion last winter. The mother says that the child is like a *rag*. Arms flaccid; hands open; cannot pick up things; muscles ill-developed; a little stiffness of right arm. Legs extended, stiff, moves them about; feet extended, bent with difficulty. Gets very stiff at times, could almost be lifted by the legs. Plantar reflexes good. Sensation good.

FIG. 1.



Position of child in walking.

Case XI.—Joseph J., æt. twenty, colored. Sent to the Infirmary from a distance, and no history could be obtained except that his parents are healthy and that the present trouble had lasted from infancy. Patient is a well-grown lad, and has been accustomed to help at farm work. He is weak-minded, and cannot give a very satisfactory account of his past condition. He has an intelligent looking face, forehead is low. Speech is imperfect, clips the words, and it is often hard to understand him. He has not much education; can read a little. The arms are well developed; uses the hands and fingers well. The legs are muscular, of equal length. When recumbent he can flex them at the knee and hip-joint, though they are somewhat stiff and there is adductor spasm. He walks with a spastic gait, the legs stiff, the thighs adducted and the toes kept close to the ground. The legs cross at each step, as shown at Fig. 6. The entire foot is placed on the ground. The arms are used to maintain the balance, and the body surges from side to side with each step. The knee-jerk is much increased, the ankle clonus can readily be obtained; superficial reflexes also increased.

The condition of the legs in these cases is practically identical with that in the spastic biplegias, and there are instances which link the two groups together. Thus, in Case II. there was inability to use the hands properly and the right arm at times became stiff, and in Case X. the elbows were occasionally stiff, though at the examination there was no trace of it.

That in spastic paraplegia the cerebrum is less profoundly affected is shown by the greater number of children who are bright and intelligent and who ultimately learn to walk. Of the eleven cases, three were mentally well developed; the others presented various grades of feeble-mindedness. Six could speak plainly; in four articulation was defective, and Case X. could only utter a few words. Only one case had strabismus, and in two nystagmus was present.

In many cases the history was defective. In only three were there difficult labors, two requiring the forceps. The paramount influence of abnormal conditions of birth or of parturition in producing this condition is well illustrated in Little's cases, of which I think twenty-four can be selected as paraplegic. Of these, in twenty-three there was either difficult labor or premature delivery; six were first children. In only one instance were the forceps applied, but we must remember that in the fourth and fifth decades of this century the forceps were not used so often as they are at present. In none of Little's cases did the feet present, a point observed by Ross¹ and others.

The stiffness of the legs may not be noted for some months after birth, but usually on washing and dressing the child the mother notices the rigidity. The child is late in attempting to walk, and then the awkwardness and stiffness of the legs become more evident. When standing the attitude is most characteristic—there is talipes equinus, varying from the slightest raising of the heel to a position in which the child actually stands on tiptoe. The heels are usually everted and the knees approximated, owing to the spasm of the adductors, which, with the gastrocnemii, become hard, tense and prominent. In most cases, owing to the elevation of the heels, the body is supported on the balls of the toes. Fig. 2 represents the foot-marks in Case 9 as the child walked, with the soles chalked on a black surface. In other instances, as shown at Fig. 3, the entire foot may be set down at each step. Owing to the extension of the limb as it is being moved forward to take a step, the toes do not always clear the ground, but drag, so that the shoe-caps are usually much worn. The strong adductor action produces a remarkable crossing of the legs, and each foot is dragged over and planted in front of, or even to the other side of its fellow. This is very well illustrated in the figures. When extreme, as in Fig. 3, which is taken from Case XI., the body is thrown from side to side in walking, and the arms are kept apart to help maintain the balance. In some instances the adductor spasm is so great that the thighs rub at each step and one foot is shuffled before the other in a series of extremely short steps. The trousers may be rapidly worn out at the inner aspect of the knees in consequence of the constant friction. In attempting to flex the legs there is marked resistance, which gradually yields, and the limb can be bent, as Dr. Weir Mitchell has expressed it, like a bit of

lead pipe. The term "lead-pipe" contraction is often used at the clinics to designate this condition. The adductor spasm may be so extreme that it is impossible to separate the thighs—clasp-knife rigidity. When at rest

FIG. 2.



FIG. 3.

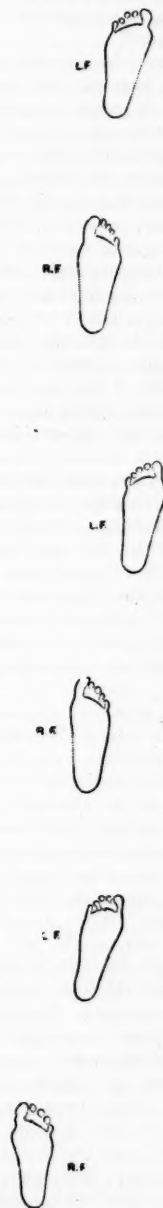


Fig. 2.—Showing spastic gait in Case IX.

Fig. 3.—Illustrating "cross-legged" progression in Case XI

the spasm may relax, but any attempt at movement or an effort on the part of the doctor to flex the leg will at once induce it. Ultimately there may be constant flexion of the legs, with permanent contracture.

¹ Loc. cit.

The reflexes are increased. The knee-jerk is almost invariably present, though in very young children it is sometimes not an easy matter to elicit. The ankle clonus, as a rule, is not to be obtained. It was present in Cases I. and XI.

Sensation is not impaired. Trophic lesions were not noticed. The functions of the bladder and rectum are unimpaired.

In brief, the symptoms of this affection in children are almost identical with those of adults, and the earlier writers on spastic paraplegia classed the cases together. Heine long ago expressed the opinion that these cases in children are of cerebral origin, and this is now generally accepted on the following grounds: 1. The frequent co-existence of symptoms indicating cerebral defects, such as idiocy, imbecility, nystagmus and the like. 2. The occurrence of cases of bilateral spastic hemiplegia, in which the paraplegic symptoms are identical with those of tabes spasmodique—cases, moreover, in which the evidence is usually very clear of the existence of profound cerebral disturbance. All gradations are met with, from pure spastic paraplegia with perfect use of the arms, to instances of the most extreme bilateral spasm with or without disordered movements. 3. The paraplegic and diplegic cases present identical histories, and a large proportion of the cases in each group are birth palsies, the result of abnormal parturition. 4. As the diplegic cases have been shown to depend upon symmetrical disease of the motor areas with, in many instances, descending degeneration, the conclusion has not unnaturally been drawn that the paraplegic form was the result of a similar though less extensive lesion. Ross,¹ Hadden² and Gowers³ take this view; d'Heilly⁴ thinks that there is not necessarily involvement of the brain, but that it may be a primary degeneration of the lateral tracts.

THE MORBID ANATOMY of infantile spastic paraplegia remains to be worked out. In a tolerably careful review of the literature, I can find but one record of a carefully performed section in a case of this kind. Förster,⁵ in a report of the Dresden Children's Hospital, among the spastic palsies, gives the following case: Boy, aged two. No history of the parents or of the delivery. At the age of one and a half years the paralysis was noticed, and he began to use the few words of speech which he had acquired. When seen at about the age of two, the arms were normal, the legs stiff, adductor spasm. When attempting to walk he stood on the outer aspects of the feet with the heels raised. Knee reflexes exaggerated. Intellect feeble. The case appears to have been one of true spastic paraplegia. The post-mortem, by Birch-Hirschfeld, showed a moderate grade of general cortical sclerosis, with slight dilatation of the ventricles. The basal ganglia were normal; no note as to pyramidal tracts on crus or medulla. The cord was firmer than normal, and the lateral tracts presented a gray-white translucent aspect, which was regarded as a descending degeneration, the consequence of brain lesion.

DIAGNOSIS.—The diagnosis of spastic diplegia and paraplegia is usually easy, but there are cases from which they must be carefully distinguished and which, at times, closely simulate them. The condition described by

writers on children's disease as *idiopathic contraction with rigidity*; *tonic contraction of the extremities*, the *contracture* of the French writers is very apt to be confounded with true spastic paralysis and *vice-versa*. The confusion which exists is illustrated in several recent papers, notably those of Onimus¹ and Launois² and the thesis of Simard.³ The majority of the cases reported by these writers belong to the category of spastic paralysis due to cerebral disease.

The chief differences between these conditions may be thus tabulated:

<i>Pseudo-paralytic rigidity.</i>	<i>Spastic paralysis: di- and paraplegia.</i>
Follows a prolonged illness. Is often associated with rickets, laryngismus stridulus and the so-called hydrocephaloid state.	Usually exists from birth. History of difficult labor, of asphyxia neonatorum or of convulsions.
Begins in hands as carpo-pedal spasm; often confined to hands and arms.	Arms rarely involved without legs, and not in such a marked degree.
Spasms painful and attempts at extension cause pain.	Usually painless.
Intermittent and of transient duration.	Variable in intensity but continuous.

The history, the limitation in many instances to the arms, the existence of rickets or other constitutional disturbance renders clear the diagnosis. The spasm in idiopathic contraction may be extreme, the arms adducted, the forearms strongly flexed and the hands clenched on the chest. In none of the cases of spastic diplegia have I met with such inflexible rigidity of the arms as existed in a rickety child which I saw with Dr. Major, of Montreal. From tetany, which in children is closely related to the carpo-pedal spasm, and occurs under similar conditions, the distinction would rest largely on etiological considerations. In early life the association with rickets and diarrhoea, and the greater involvement of the upper extremities are features of tetany.

It must not be forgotten that tumors of the pons and of the cerebellum may produce a bilateral rigidity when the motor paths are involved or compressed. Tubercular growths of the cerebellum seem specially liable to induce this symptom. In the Gultonian Lectures for 1886, Sharkey⁴ reports four cases, in each of which the tumor occupied such a position that it compressed either pons or medulla.

ORIGINAL ARTICLES.

A CASE OF LAPAROTOMY AND INTESTINAL SUTURE FOR GUNSHOT WOUND OF THE ABDOMEN; DEATH FROM ACUTE PERICARDITIS.

BY ROSWELL PARK, A.M., M.D.

PROFESSOR OF SURGERY, MEDICAL DEPARTMENT, UNIVERSITY OF BUFFALO, BUFFALO, N. Y.

ON the 6th of March, 1888, I found myself in Bradford, Pa., on a semi-professional errand. On leaving the train, I was accosted by a friend and urged to hasten at once to one of the banks, where the cashier had been assailed by a masked robber.

¹ Revue men. des Maladies de l'Enfance, 1883.

² France Médicale, 1884.

³ Thèse de Paris, 1884, No. 85.

⁴ Spasm in chronic nerve disease, London, 1886.

¹ Loc. cit.

² Loc. cit.

³ Loc. cit.

⁴ Loc. cit.

⁵ Jahrbuch für Kinderheilkunde, Bd. xv.

I lost no time in proceeding there, and, on arriving, found a gentleman, thirty-two years of age, lying on a mattress in a rear room, and learned that he had been shot completely through the body. Several physicians were already in attendance, and, invited by them, I made a casual examination. I found that the bullet had passed back of the middle plane of the body, just below the false ribs. The wound of entrance was just below the margin of the liver, and that of exit in a corresponding position on the left side, a little nearer the back. When I first saw the man he exhibited a severe degree of shock. Stimulants were freely administered, and he was conveyed to his house by those in attendance. He was placed, for the time being, under my care. I could not but conclude that the intestines had been wounded, and could only advise an exploratory laparotomy. I had with me only my ordinary pocket-case, being utterly unprepared for any such operation. From several of my professional friends in Bradford I borrowed other instruments, sufficient for the necessities of the case. At the drug store I had sponges prepared hastily and silk sutures boiled, and in various ways, as best I could, I prepared for the operation.

The patient had been injured at eleven o'clock in the forenoon; at about three the operation was begun. In the meantime he had rallied well from the shock, and was urgent that the operation should be undertaken. I was assisted by Drs. Nichols, Murdock, Van Scoy, Freeman and others, and most of their professional brethren were present. Incision was made in the middle line, chloroform being the anæsthetic. There was a good deal of blood in the cavity of the pelvis, to remove all of which I had to prolong the incision downward and to lift out all the pelvic viscera. There was no injury to any of the pelvic contents. Exploring higher, I had to extend my incision well toward the sternum, and then found that blood was trickling from some injured point well up toward the diaphragm. After long, careful and diligent search, I found a perforation in a loop of small intestine up behind the colon. There was no tendency to eversion of its mucous lining, so I closed it with a Lembert continued suture of fine silk; but the bleeding did not come from this point. On exploring further, it was only after lifting up the stomach that in a neighboring concealed loop I found another perforation with eversion and a long rent along the mesenteric border. These were also closed with Lembert sutures, but with great difficulty, since they lay so deeply, and since the mesentery was so short. After careful examination, I could find nothing more in the abdominal cavity; so I closed the abdominal wound with numerous silver sutures. The wounds of the abdominal parietes I irrigated and drained with very small rubber tubes, and closed with an antiseptic, occlusive dressing.

The operation altogether consumed about one hour and forty minutes. It was of necessity longer than would have been the case had the conveniences

at hand been better. The patient rallied from the shock, was given morphine hypodermatically, and became comfortable through the night. He was only disturbed by belching of gas, which occurred frequently. The next morning his temperature was $99\frac{1}{4}^{\circ}$, his pulse 110 and his general condition most satisfactory. My business taking me to an adjacent town, I did not see him again until 2 P. M. of the second day. I learned, however, from Dr. Nichols, in whose immediate care he remained, that late the previous evening his pulse began to fail and his temperature to rise. At 1 A. M. he evidently began to sink, and toward morning became unconscious. There had not been any distention of the abdomen, and his pulse did not present the usual features of the pulse of acute peritonitis.

When I saw him at 2 P. M. he was comatose; his pulse scarcely perceptible. The abdomen had shrunk rather than distended, so much so that his dressing seemed a little loose. On placing my ear over the heart, a very loud pericardial friction sound was heard. This was so loud, in fact, as almost to obscure the other cardiac sounds; but he was beyond help and died at 3 P. M., fifty-three hours after the injury, and forty-seven hours after completion of the dressing.

A partial autopsy was made the next day by Drs. Nichols and Straight. They informed me that the wounds we had sewed were found perfectly united, that no leakage had taken place, that in some places the stitches were covered out of sight by plastic lymph. Only slight local peritonitis was found, and the long incision in the abdominal wall had healed by first intention. There had been no hemorrhage, and altogether everything in the abdomen was in as satisfactory a condition as could be expected or desired. The thorax was not opened; consequently nothing can be told about the pericardium.

Here was a desperate case of gunshot wound of the intestine with operation performed under trying circumstances, without adequate facilities, and death occurred from a most unexpected complication. That acute pericarditis is an occasional result of surgical conditions of greater or less magnitude is a fact not unknown, though we are still utterly in the dark as to its etiology. In the case at hand, for instance, time had not elapsed for any septic complication, nor was there the slightest evidence of sepsis, either clinically or post-mortem. Various authors on diseases of the heart are peculiarly reticent on this subject, and the case seems of interest, as much on account of its termination and the cause of death as for any other of its peculiar features.

THE PHYSIOLOGY OF THE NOSE.

BY F. H. BOSWORTH, M.D.,

PROFESSOR OF DISEASES OF THE THROAT IN THE BELLEVUE HOSPITAL
MEDICAL COLLEGE, NEW YORK.

POPULAR conception of the nose, from time immemorial, has regarded it mainly as the organ of the sense of smell. This view has, I think, been accepted by medical observers up to comparatively recent

times. The ancients believed that respiration was for the purpose of cooling the blood. Helvetius, in 1729, supporting this view, adduced as an argument in its favor, the fact that the area of the pulmonary vein was larger than that of the pulmonary artery. In 1823, Friederich Hempel¹ asserted that the air was heated in the lungs, making no reference to the nose or mouth as bearing part in this function, regarding the nose as an organ to test the quality of the inspired air, before it passes into the lungs. In 1829, Magendie² says, "By successively traversing the mouth, nasal cavities, pharynx, larynx, trachea and bronchi, the inspired air becomes of a similar temperature with the body. . . . The inspired air is charged with vapor which it carries away from the mucous membrane of the air-passages, and in this state always hot and humid, it arrives at the pulmonary lobules." In the same year, Adelon³, making no mention of the functions of the nose in respiration, speaks of the moisture of the expired air having its sole source in the lungs. In 1844, we find Duglison⁴ making the following statement: "In passing through the mouth, nasal fossæ, pharynx, larynx, trachea and bronchi, the inspired air acquires pretty nearly the temperature of the body." As early as 1845, however, we find appearing in medical literature, evidence of the recognition of other and important functions as belonging to the nasal chambers, independent of the other portions of the upper air-tract. The first evidence of this I find given by Vierordt⁵, who, I think, was the earliest to emphasize the fact that the air is raised in temperature in passing through the nasal chambers, thus recognizing the fact that the other portions of the upper air-tract contribute no part in this important function.

In 1864, we find Nestor Gréhant⁶ investigating this subject experimentally. His apparatus consisted of a glass tube containing a thermometer, through which the expired air was made to pass by inserting the tube in the mouth. To protect the thermometer from the temperature of the surrounding air which might thus vitiate the experiment, the tube containing it was enclosed within a second tube, and the space between was filled with cotton.

Gréhant found that with the temperature of the room at 12° C. (53.6°F.), and the patient breathing seventeen times per minute, inspiring through the nose, that the temperature of the air expired through the mouth and apparatus was 35.3° C. (95.5°F.). If, instead of inspiring through the nose, the end of the tube within the mouth was closed with the tongue,

and inspiration was performed through the mouth and expiration through the tube, then the temperature of the expired air was only 33.9° C. (93°F.). Although, as will be shown further on, these results are erroneous, the investigation goes to show that, even at this time, the importance of the nose as an organ of respiration was beginning to be recognized.

In a second series of experiments, Gréhant showed that the expired air was saturated with moisture at a temperature of 35° C. (95°F.) and not at 38° C. (100.4°F.) as Valentine had before stated. The error had been made on account of the momentary cooling of the surface of the hygrometer by the expired air; by correcting this error of experimentation, by enclosing the polished face of the hygrometer so that the expired air should not momentarily cool its face, the true result was obtained.

Subsequent to this we find such standard works on physiology as Dalton and Foster making no mention of the fact that the air is warmed and moistened within the nose and mouth before entering the lungs. Flint,¹ however, writes as follows: "The vapor in the expired air is derived from the entire surface which is traversed in respiration, and not exclusively from the air-cells. The air which passes into the lungs derives a certain amount of moisture from the mouth, nares and trachea. The great vascularity of the mucous membranes in these situations, as well as of the air-cells, and the great number of mucous glands which they contain, serve to keep the respiratory surfaces constantly moist. This is important, for only moist membranes allow the free passage of gases, which is, of course, essential to the process of respiration."

Rosenthal² claims that air is already warmed and saturated when it reaches the alveoli.

These functions, however, are attributed to the nose in a somewhat adventitious manner, and the general view seems still held that olfaction is the main function of the nasal mucous membrane. Even as late as 1878, we find Remy³ alluding to the nose as the organ of olfaction, and directly stating that its other functions are purely secondary and adventitious. Remy first states that the watery secretion of the nose is for the purpose of moistening odorous particles, by which they are rendered sensible to the olfactory nerve. His exact language is as follows: "Cette membrane forme l'extrémité supérieure des canaux respiratoires mais, ce n'est pas là son principal but. Cette muqueuse fait partie constituante d'un organe des sens, et ce n'est qu'accessoirement qu'elle sert à un autre usage qu'à la fonction sensorielle."

¹ Einleitung in die Phys. und Path. des Mensch.

² Physiology, Edinburgh, 1829, Milligan's translation, 3d ed., p. 387.

³ Physiologie de l'homme, Paris, 1829.

⁴ Human Physiology, 5th ed., vol. ii, page 31.

⁵ Physiologie des Athmens, Carlsruhe, 1845.

⁶ Thèse de Paris, 1864, 161, Recherches Physiques sur la Respiration de l'homme.

¹ Text-book of Human Physiology, N. Y., 1876, p. 154.

² Handbuch der Physiologie von Hermann, 1880, iv., 2 S. p. 389.

³ Thèse de Paris, 1878, la Membrane muqueuse des fosses nasales.

An additional function of the nose in phonation was first suggested by Helmholtz,¹ in his beautiful theory of overtones, and subsequently more specifically elaborated upon by Gordon Holmes in his admirable work on the voice.² That this conception of the physiology of the nose is an imperfect one and unsatisfactory, I think very emphatically impresses itself upon anyone who has made special study of these chambers in pathological as well as physiological conditions.

The nose undoubtedly possesses a threefold function, in olfaction, phonation and respiration. But that the function of olfaction is the prominent one, I think, is based on entirely incorrect views. The great and important function of the nose is as an organ of respiration, the other functions being entirely secondary.

As we know, the olfactory nerve is distributed in the mucous membrane lining these chambers, but this location is, to an extent, adventitious. Nature found the most convenient place for the distribution of this nerve at the entrance of the air-passages, where it should receive the first impact of odorous particles floating in the current of inspired air. These filaments of the olfactory nerve might have been located in the roof of the mouth, but we easily see how such a location would subject this delicate membrane to great injury on account of the other functions necessarily performed in this cavity. Hence we find the olfactory nerve distributed in the mucous membrane lining the upper and smaller portion of the nasal chambers, where it is thoroughly protected from injury, and deeply sequestered and walled in, as it were, by its bony surroundings. The function of the nose in phonation needs no special reference. We all recognize the fact that a peculiar resonance and richness of tone of the human voice is largely dependent upon vibration of air in these chambers, as is demonstrated by the fact of this resonance disappearing when the nasal passages are occluded.

It is as a very important, perhaps the most important, and certainly the most intricate portion of the respiratory tract that the nose possesses the highest interest to us. That greater stress has not been laid on this function by writers and observers has always been something of a surprise to me, and yet a careful search of our literature fails to reveal any such recognition until within the last few years.

In a paper read before the American Climatological Association, May 28, 1885, on "Hay Fever, Asthma and Allied Affections,"³ I first gave somewhat in detail certain views in regard to the respiratory function of the nasal chambers, which subjected me to

considerable adverse criticism. All that I then stated I still adhere to, and believe the views there advocated to be entirely correct. The importance of this communication, I think, cannot be overestimated, and I therefore quote in full the views there laid down:

"The normal function of the mucous membrane is to secrete mucus, and only in such quantities as are sufficient to keep the membrane in a soft, moist and pliable condition. Any excess of this amount becomes a morbid secretion. Normally, nasal mucus is composed of 93 per cent. of water and 7 per cent. of solid matter. Robbed of a small portion of this water, it becomes thick, inspissated and unhealthy. Now, as we know, every breath of air that passes through the nasal chambers and reaches the passages below must become surcharged with moisture; otherwise it would rapidly exert a deleterious influence on the mucous membrane of the air-passages beyond in robbing them of their moisture, and so rendering their mucus thick and inspissated. It is estimated by physiologists that in the course of twenty-four hours about five thousand grains of water are taken up by the inspiratory current of air, in its passage through the respiratory apparatus. If, in other words, the humidity of the inspired air be compared with that of the expired air, it will be found that, in addition to the other changes as regards carbonic acid and oxygen, the inspired air will have gained five thousand grains of water. Now, I think I am safe in saying that, if five thousand grains of water were extracted from the mucous membrane of the bronchial tubes and air-cells in the course of twenty-four hours, the result would be complete destruction of their function, to such an abnormally dry condition would they be reduced; for, as we know, in each act of respiration the inspired air reaches only the larger bronchial tubes, and the source of moisture, therefore, of the inspiratory current cannot be from the smaller bronchial tubes or air-cells. We are, therefore, forced to the conclusion that this surplus of five thousand grains is taken up by the inspiratory current during its passage through the nasal chambers, and is still retained by it as it makes its way out through the air-passages, for the only source from which this amount of water could be taken up is the nasal mucous membrane. Certainly from no other mucous membrane of equal area in the body is it possible that such an amount of water could be secreted in twenty-four hours in health. Now, the mucous membrane of the air-passages is endowed with no especial apparatus for the secretion of water; the only secretory apparatus with which it is endowed is in the mucous glands, which secrete mucus alone.

"In the nasal mucous membrane, however, we find an apparatus capable of furnishing this water, and this is the so-called erectile tissue of the turbinated bodies. The necessity for some such apparatus I need not refer to, further than to say that it is absolutely necessary and essential, for the integrity of the lower air-passages, that the air which reaches them should be so far charged with moisture that they should not be robbed of any of their secretion. Especially is this true in a variable climate like ours, in which so great changes occur, characterized by excessive humidity or absolute dryness of the atmosphere.

"This, then, is the great and prominent function of the nasal chambers, so to prepare the ingoing current of air that it shall exercise no injurious influence on the mucous membrane of the passages below. It has always seemed to me that this great respiratory function of the nasal chambers has been to an extent overlooked in regarding the nose as an olfactory organ, for whereas impairment or loss of the sense of smell is but an incon-

¹ Die Lehre der Tonendfindungen als physiologische Grundlage für eine Theorie der Musik. [Ellis translation, p. 40.]

² Vocal Physiology and Hygiene. Gordon Holmes. London, 1879, p. 129.

³ N. Y. Med. Journ., April 24 and May 1, 1886.

venience, and not dangerous to the health, the impairment of the respiratory function of the nasal cavities involves very serious danger. Thus the nose as a respiratory organ becomes infinitely more important to us than as an olfactory organ.

"As before stated, the nasal chambers contain no glands which secrete other than mucus. There are no serous glands. The mechanism, however, by which the water is poured out into the nasal chambers, and the ingoing current thus surcharged with moisture, is in this so-called erectile tissue. The watery constituents of the blood transude the mucous membrane, and appear on the tortuous surfaces and passages of the cavity. Now, unless the bloodvessels underlying a membrane called upon for this duty were very large and very numerous, they would be inadequate to supply this large demand. Nature, therefore, has furnished the membrane in this region with such an abundant supply of large, tortuous vessels that they assume the appearance of erectile tissue, and thus have given rise to this erroneous idea as to their function suggested by the name erectile tissue. Were the bloodvessels in this region of the same calibre and capacity as those of other portions of the air-tract, it is easy to understand how the extraction of so great a quantity of water would soon render the current sluggish by its greater consistence, and so completely arrest the function which they were designed to subserve. In addition to this large blood-supply there must be, of course, some delicate mechanism by which this function is regulated. This control is exercised by the vaso-motor system of nerves. So delicately must this be arranged that the transudation of serum must accurately adapt itself to every existing atmospheric condition. To-day, for instance, with air saturated with moisture, the turbinated vessels must be so far kept in control by the vaso-motor nerves that no serum escapes. To-morrow, again, with an almost absolutely dry atmosphere, under the action of the vaso-motor nerves, the blood control is unlocked, as it were; the turbinated vessels are so charged with blood that the current becomes active, and the amount of serum poured out on the mucous surface of the nasal cavity is such as thoroughly to saturate the ingoing current of air with moisture, and still not impair the consistence of the blood flowing through the vessels. This control must be so delicately exercised as to meet not only daily, but even momentary changes in the humidity of the inspired air. It is easy to see, therefore, how great the demand must be upon the vaso-motor nerves which regulate the calibre of these bloodvessels, how constant the watchfulness which controls this exosmotic action, and therefore how easily any impairment of this function might occur."

These views were based on the result of many years of clinical observation of this membrane both in health and disease.

From an anatomical point of view, it is difficult to understand why nature should have placed in these passages the somewhat intricate and complex mechanism which we there find, unless it was designed to subserve some important purpose. That this purpose is not connected with the function of phonation or olfaction I think cannot be questioned. We must then conclude that its design is connected with the function of respiration. I think we can more clearly reach a conclusion in the matter by a reference to the anatomy of this membrane.

In brief, we find the nose consisting of two wedge-shaped cavities, extending from the nostrils to the

posterior nares, their inner wall consisting of the smooth face of the vomer and cartilages of the septum; their outer wall being formed by the superior maxillary, ethmoid and palate bones. Imposed upon this wall, we find the three so-called turbinated bones, scroll-shaped bones, which are designed to increase the surface over which the mucous membrane is distributed, dividing the cavity, as anatomists tell us, into three passages, which are mainly nicely drawn distinctions of an anatomical character. The floor is made up of the smooth surface of the palate and superior maxillary bones. These bony cavities are lined by a mucous membrane. Now, a mucous membrane is pretty much the same thing wherever you find it. It is simply a typical membrane, which is found lining all the cavities of the body which communicate with the external world. As a necessary part of the design of these cavities, their lining membranes must be soft, moist and pliable. In order that they shall possess these three properties, nature has embedded in their tissues certain glandular structures which secrete mucus. This mucus is to be regarded simply as a lubricant, and nothing more. No mucous membrane in the body is endowed with secreting structures more than sufficient to pour out on its surface just sufficient mucus to lubricate the membrane and keep it soft and pliable.

If there are any exceptions to this rule, they are merely such exceptions as are demanded by particular localities, as, for instance, in the vault of the pharynx and between the two pillars of the fauces we have large masses of glands which pour out an abundant supply of mucus, whose function is to lubricate the bolus of food, and facilitate its passage into the stomach. But aside from these rare exceptions, no mucous membrane is endowed with the power of secreting but a limited supply of mucus. Nor does nature ever call upon it to do more. We have here, then, in the nose, so far nothing which renders it capable of subserving any special function in the economy; simply a bony cavity lined with mucous membrane. In the upper part of this cavity we find distributed the nerve of olfaction. Here we find an additional function, which demands for its healthy action nothing further than a moist membrane, which will afford protection and distribution for the olfactory nerve.

In addition, however, to the parts already described, there are found *beneath* the surface of the mucous membrane, on the faces of the lower and middle turbinated bones, large plexuses of bloodvessels, the turbinated bodies, which have figured so extensively in our literature of the last fifteen years, and have been the subject of so much speculation and discussion. This mass of bloodvessels was recognized by anatomists in the last century, but in a vague and somewhat indefinite way.

According to John Mackenzie,¹ the spongy character of this tissue attracted attention as early as 1656, being mentioned by Rolinc.²

Schneider³ recognized it as containing vascular tufts, but did not recognize its cellular structure. This was first mentioned by Ruppert.⁴

Duverney⁵ gives a more detailed description, and states that the membrane can be inflated by a blowpipe inserted into the veins.

The first to announce distinctly its true erectile nature was probably Cruveilhier,⁶ who describes it as a very vascular and truly erectile tissue, and demonstrates its structure by the injection of mercury through the lymphatics.

The first careful anatomical investigation of this tissue was made by Kohlrausch,⁷ who described what he supposed to be large venous sinuses existing in the deep layer of the membrane. Such a plexus had been previously referred to by Hyrtl, as acknowledged by Kohlrausch. It was subsequently claimed as an independent discovery by Kölliker.⁸ In 1873, Bigelow⁹ made some very careful observations of these structures, in which he demonstrated the existence of erectile tissue. It should be stated, however, that Kohlrausch¹⁰ in his investigations had shown the existence of loops or helicine arteries, which at that time were recognized as an anatomical condition characteristic of erectile tissue. Kohlrausch's investigations were made in the moist tissue. Bigelow inflated the moist tissue with a blowpipe inserted into the veins themselves, as had been done already by Duverney,¹¹ and made his sections after the preparations had been allowed to dry. Bigelow's demonstration showed a very beautiful, spongy tissue. These observations were subsequently very nicely confirmed by Ischwald.¹² All these investigators asserted that this tissue was erectile tissue, their conclusions being based apparently on anatomical study alone.

Zuckerkandl,¹³ however, whose classical work on the anatomy of the nose is the standard authority to-day on this subject, has made an exhaustive anatomical study of this membrane, in which he de-

scribes the mucous membrane covering the turbinated bones as consisting of connective tissue, the upper surface covered with flat epithelium, the deep layer forming the periosteum of the turbinated bones. Between these two layers we have abundant lymph tissue, and possibly lymph glands, although these have not been definitely made out. The tissue covering the turbinated bones is studded here and there with tubular mucous glands, many of which extend completely through to the periosteum. Within this lymphoid structure we have abundant venous plexuses, to which he gives the name "Schwellkörper" (swell bodies). About the venous plexuses the unstriped muscular fibre is abundantly distributed. The definite localization of the venous plexuses serves to distinguish this tissue from true erectile tissue, such as is found in the corpora cavernosa of the penis. The arterial supply is derived from the spheno-palatine artery. The capillaries are divided into three sets, one set being distributed to the periosteum, the second to the glands, the third to the surface. The capillaries distributed to the surface form loops which empty into veins, together with the superficial gland capillaries. The deeper gland capillaries and those distributed to the periosteum, pass into the veins, forming the so-called Schwellkörper, and the blood is then conveyed by venous channels in the periosteal surface of the membrane to five distinct plexuses, one going to the veins of the face, the second to the veins of the cranium, the third to the orbit, the fourth to the soft palate, and the fifth to the hard palate. These Schwellkörper are distributed, according to Bresgen,¹ quoting from Zuckerkandl's anatomy, as follows: One over the lower turbinated body, one along the border of the middle turbinated body, and one at the posterior extremity of each of the turbinated bodies.

We find, therefore, the nasal cavity containing this most intricate and delicate apparatus, which is designed to subserve the function of the already described serous exudation. The special method by which this serous transudation takes place we are scarcely ready to describe, though a very important suggestion comes to us from the notable observation of Chatellier.² He describes certain minute canals, running at right angles to the mucous membrane, penetrating to the lymph channels. Chatellier makes the suggestion that these canals serve the purpose of serous channels. The question arises, Whether Chatellier's canals may not be the tubular mucous glands of Zuckerkandl?

As before stated, when I first described this great respiratory function of the nasal mucous membrane, the observation met with considerable opposition

¹ Historical Notes on the Discovery of the Nasal Erectile Tissue. Boston Med. and Surg. Journal, Jan. 1, 1885.

² Dissertationes Anatomicae Noribergae, lib. ii. Cap. 20.

³ De Catarrhis Wittburgae, 1661-62, lib. v. passim.

⁴ Diss. inaug. med. de tunica pituitaria, ejus anatomiam, physiologiam et pathologiam exponens, Vetero Pragae, 1754, Para. i. p. 23.

⁵ Œuvres Anatomiques, Paris, 1761, tome i. p. 222.

⁶ Traité d'Anatomie descriptive, Paris, 1845, tome iv. p. 55.

⁷ Müller's Archives, 1853, p. 149.

⁸ Handbuch d. Gewebelehre des Menschen, Leipzig, 1867, p. 741.

⁹ Boston Medical and Surgical Journal, April 29, 1875.

¹⁰ Loc. cit.

¹¹ Progrès Médical, September 10, 1887.

¹² Wiener medizinische Wochenschrift, 1884, vol. 34. pp. 1121-1125. Schwellgewebe der Nasenschleimhaut und dessen Beziehungen zum Respirationspalt.

¹ Das Circulationsapparat in der Nasenschleimhaut, von klinischem Standpunkt betrachtet, Deut. med. Wochenschrift, Berlin, 1885, Nos. 34, 35.

² Annales des Mal. de l'Or., etc., No. 6, June, 1887.

and criticism.¹ Dr. Sherwell, of Brooklyn, took issue with my statements as something entirely novel, radical, and, as not having been based on physiological research and clinical observation. Sherwell cited cases of complete nasal stenosis, with habitual mouth breathing, in which the pathological lesions of the lower air-passages were not observed. This opens up rather a large question. The old physiological observation on the difference between the inspired and expired air, in which it is claimed the expired air gains a large amount of moisture in respiration, is, I believe, invariably made by the insertion of the tracheotomy tube in one of the lower animals.

Now, there is this to be said with regard to Sherwell's criticism: When any radical change is effected in the economy, by which extraordinary demands are made on an organ, that organ is generally found equal to the emergency. Probably there is no organ in the body which is not capable of doing twice the work which nature usually demands of it. If one kidney is extirpated, the other kidney is equal to the double duty, and so of other organs. When a tracheotomy tube is inserted, nature makes an effort to accomplish the normal respiratory process, and for a time succeeds. Air, containing a fixed amount of moisture, entering the lung through the tracheotomy tube, comes in contact with a cavity filled with air in a state of saturation. Necessarily, by an invariable law of nature, a portion of that moisture is taken up and conveyed to the outer world in the expired air, fulfilling the requirements of the old physiological experiment. But this process cannot go on indefinitely. The moisture of the expired air is acquired, evidently, by robbing the mucous membrane of the bronchial tubes, with the subsequent result of inspissated mucus, bronchial irritation and bronchitis. Sherwell was quite right in the assertion that my observations were based on no physiological experiments; no definite data were given. They were based entirely on clinical observation of the respiratory process, both in health and in disease, continued through a number of years. Since Sherwell's letter was published, however, I find my observations confirmed in a very striking manner by Aschenbrandt's² exhaustive experiments, in which data of a sufficiently definite character are given to establish all of my conclusions.

Aschenbrandt's experiments were conducted in the Physiological Institute of Professor Flick, of Würzburg, and in the following manner: An air aspirator, with a capacity of five litres (five and a quarter quarts), is attached to one of the nostrils by means of a glass tube in which a thermometer is fixed in such a manner as to register the temperature of the

air immediately upon its exit from the nose. One litre (quart) of air is passed every six seconds, each experiment being finished in thirty seconds. In a large number of experiments Aschenbrandt found, that with the temperature of the air in the room varying from 8° C. (46.4° F.) to 12° C. (53.6° F.), the temperature of the air as it passed from the nose did not vary from 30° C. (86° F.). Now the temperature of the expiratory current in ordinary respiration is 30° C. (86° F.), which shows conclusively that the warming of the air in respiration is done exclusively by the nose.

Experiments were also made as to the amount of moisture in the expired air, and were conducted with the same apparatus. He found that each five litres (five and a quarter quarts) of expired air contained 0.18 gram (2.77 gr.) of water, which constitutes complete saturation, and furthermore that the whole amount withdrawn from the body in twenty-four hours was 500 grams (7715 gr.), and that the source of this, therefore, was in the nose. A still further conclusion was drawn from these experiments, that all mechanical dust is completely arrested during inspiration, and is deposited on the moist surfaces of the nasal membrane.

Subsequent to Aschenbrandt's observations, Kayser¹ made a series of investigations in the same line. He made use of the same aspirating bottle as Aschenbrandt, and the thermometer tube fitted into the nostril is essentially the same. In Aschenbrandt's investigations, however, the upper pharynx was not shut off, and hence warm air could be drawn from the mouth out through the nose, by the aspirator, and thus vitiate the experiment. To obviate this source of errors in Kayser's experiments the palate is held up by a spatula, after the application of cocaine, and the upper pharynx and nose shut off completely from the lower pharynx and mouth. The temperature of the air after passing through both nostrils, five litres (five and a quarter quarts) in thirty seconds, was found to be the same as in Aschenbrandt's experiments, 30° C. (86° F.), when the temperature of the inspired air was 12° C. (53.6° F.); with external temperature of 0° C. (32° F.) to -4° C. (24.8° F.), the temperature of expired air was 27.5° C. (81.5° F.). If the inspired air was 19° (66.2° F.) to 20° (68.7° F.), the expired air was 32.3° (90.1° F.) to 33.5° (92.3° F.).

For testing the heating power of one nostril, instead of passing a tube through the mouth behind the palate, closing one nostril, and aspirating through the other as Aschenbrandt did, Kayser passes a caoutchouc tube through the inferior meatus of one side, the posterior end of this tube passing beyond the choana; the anterior end was fitted closely into the nostril by means of a rubber cork. The appar-

¹ The New York Medical Journal, May 22, 1886.

² Ueber die Bedeutung der Nase im Respiration, Th. Aschenbrandt, Würzburg.

¹ Pflüger's Archives, vol. xli. pp. 127-47, 1887.

atus for aspiration and determining the temperature was then fitted to the other nostril. It is easy to see that by this means the heating effect of only one nasal cavity was obtained. The palate was held up as in the preceding experiment.

In this experiment, Kayser differs somewhat from Aschenbrandt, for while Aschenbrandt found that the air was heated just as much in passing through one nasal cavity as through both, Kayser found that it was heated about 0.5° (0.9° F.) less. Variations in external temperature made the same difference in the expired air as in the first experiment.

Kayser also performed a series of experiments for the purpose of finding how much the air was warmed in oral breathing. A caoutchouc tube was passed through the inferior meatus of one side to the choana, and the opposite nostril closed with the finger. The tube containing the thermometer was fitted into a cork, and held between the lips. The aspiration was then performed in the usual way. It was found that the air was heated almost half a degree less than in passing through both nostrils.

For determining the amount of moisture in the air after its passage through the nasal chambers or mouth, the thermometer tube was replaced by a U-tube containing pumice stone and sulphuric acid. The increase in weight of the tube at the end of each experiment enabled him to calculate the amount of water contained in the expired air. As a result of these experiments he found that in its passage through the nose or mouth the air was completely saturated with moisture.

The above experiments, as originally suggested by Aschenbrandt, were intended to approximate as nearly as possible the conditions of normal respiration, the tidal air being taken as five hundred cubic centimetres, and respiration rate as twenty. In thirty seconds, then, five litres (five and a quarter quarts) of the air would pass through the respiratory passages. Kayser points out that at least half the time is consumed by expiration and repose, and consequently in the experiment the air has been allowed to remain in the nose and mouth at least twice as long as it does in normal respiration. He, therefore, repeated all of the above experiments, regulating the aspirator so that five litres (five and a quarter quarts) would pass in fifteen seconds instead of thirty seconds. He found, however, that this increased rapidity did not notably influence the result, either with reference to temperature or saturation.

To simulate as nearly as possible the conditions found in the trachea and bronchi, Kayser made use of a glass tube of such a length and diameter that its area was about equal to that of the trachea and larger bronchi. This tube was lined with filter paper saturated with water. A thermometer was fixed in this tube so that its temperature could always be determined, and the temperature was kept constant by

enclosing it in a hot-air bath. One end of the tube was left open, the other was connected with the tube containing a delicate thermometer, the same apparatus, in fact, used in the preceding experiments for determining the temperature of the expired air. Here he found that lowering the temperature of the air before aspiration made considerable difference in the temperature of the air after aspiration, and that doubling the rate of aspiration also exerted an influence upon the temperature and moisture of the air after aspiration.

For the filtering out of mechanical dust Kayser claims that Aschenbrandt's investigations are not conclusive, since with the apparatus with which the experiment was made very little dust could get into the nose at all. He consequently improved the apparatus, using a glass globe with three openings. One of these communicates with a bellows used to agitate finely powdered magnesia, the second is open to the air, the third is connected with a glass tube fitting tightly into one nostril. A similar tube connected with the aspirator is fitted to the other nostril. If now aspiration is conducted in the usual manner, and at the same time the dust is agitated by the bellows, Kayser finds that dust can still make its way around into the nostril connected with the aspirator, thus proving that the nose is not a perfect filter for mechanical dust.

Kayser makes the further observation, that when cold air is inspired through the nose, there is a notably increased blood supply in the turbinated bodies, thereby increasing their heating capacity. In this connection he suggests that in tracheotomy the inspired air in summer must be of a temperature of 30° (86° F.) to 35° C. (95° F.), and in winter of 25° (77° F.) to 28° C. (82.4° F.), and in each case must be saturated with moisture in order not to produce bronchial irritation; the reason being that the bronchial membrane is not endowed with a special apparatus for moistening and heating the air.

It will be noticed that Kayser makes no definite statement as to the amount of moisture poured out by the venous sinuses of the nose in the twenty-four hours. Aschenbrandt, however, makes the statement that the whole quantity of water which the air in respiration draws from the human body amounts to about 500 grams (7715 grains) in the twenty-four hours, and this is taken from the mucous membrane of the nose. This observation, however, was scarcely necessary, when the amount given in my original paper as from twelve to sixteen ounces is the amount given by all physiologists as the amount taken from the lungs. Both Aschenbrandt and Kayser, however, make the definite statement that all the air which passes to the lungs through the nose is in a state of saturation. Of course, saturated air passing in and out of the lungs takes absolutely no moisture from the bronchial mucous membrane.

The proposition is proven beyond question, as previously stated by myself, that the sole source of moisture is in the nose. I think we may declare it as an established truth, that the function of the so-called erectile bodies is serous transudation, and that they are designed to subserve no other function in the economy.

The observers already quoted have made allusion to the fact already generally accepted by physiologists, that the air in passing through the nose is cleansed, in that floating particles of foreign matter lodge against the moist and tortuous surfaces. Probably, however, this is an adventitious function; certainly it is a very unimportant one. I have never regarded the bronchial mucous membrane as subject to any serious danger from floating particles of foreign matter making their entrance with the inspired air. In seeking for a proper function to assign to this falsely called erectile tissue of the nose, the assertion has been made, notably by John McKenzie, that they are designed to swell up and thereby close the nasal passages to prevent the entrance of foreign bodies. This observation, it has always seemed to me, was based on the original mistaken idea that the turbinated bodies are erectile tissue; and, therefore, their function is to become erect. I think it has been demonstrated that these bodies are not erectile tissue. Furthermore, they never become erect in health or disease. Certainly, if nature intended that they should swell out, and thereby occlude the nasal passages to prevent the entrance of foreign bodies, thereby compelling the opening of a far more vulnerable tract through the mouth, nature has been guilty of an awkwardness of design which presents no analogy in the whole human economy.

26 WEST FORTY-SIXTH STREET, NEW YORK.

**SOME CONSIDERATIONS CONCERNING THE
OPERATION OF VAGINAL HYSTERECTOMY
FOR CARCINOMA, ESPECIALLY CER-
TAIN OBSCURE CONTRA-
INDICATIONS.**

BY ANDREW F. CURRIER, M.D.,
OF NEW YORK.

**REPORT OF AUTOPSY SUBSEQUENT TO VAGINAL
HYSTERECTOMY AND INFERENCES FROM
THE FINDINGS.**

BY WILLIAM H. PORTER, M.D.,
OF NEW YORK.

It has usually been stated by those whose experience in vaginal hysterectomy has been extensive that, given a case in which the disease (carcinoma) is not so far advanced as to render hysterectomy impracticable, the principal contra-indications are a very small vagina or a very large uterus.

The ten years that have elapsed since this operation came into prominence have been very fruitful

ones. Not only have they demonstrated its great advantage over the method by abdominal section, both in respect to the facility with which it can be performed and the less degree of risk as to the immediate results of the operation, but they have also shown that there is a possibility in a certain proportion of cases of removing all the diseased tissue.

Removing diseased tissue, however, is quite different from removing a tendency to disease, and herein doubtless lies the explanation of the early recurrence of carcinoma in many cases in which a most rigid examination of the amputated mass shows that the section has been made beyond the diseased and into the sound tissue. This applies alike to cancer of the uterus and cancer in any other part or organ, and this opinion gains weight from the statements of MacEwen at the discussion on cancer before the Glasgow Clinical and Pathological Society, in 1886 (see *Glasgow Medical Journal*, April to July, 1886). He had observed that in cases of cancer of the lip, in which the amputation was extended quite beyond the apparent limits of the disease, the epithelium of the apparently sound skin, contiguous to that which was evidently diseased, began to show signs of disturbance and irritation before proliferation or infiltration had occurred. It would seem as if there were a kind of epithelial infection, as Rindfleisch believed, though perhaps not in the sense in which he regarded it, which renders permanent recovery, even after the most carefully conducted operations for cancer, so delusive.

In uterine cancer especially one cannot be too confident that even the diseased tissue has all been removed, though the uterus may have been small and perfectly movable, and the history of the patient without especially damaging features. The case which is here recorded will sustain this statement, and, in view of the possibilities, suggests for each case a careful weighing of the argument of Martin and Schauta in favor of complete removal of the uterus, with that of Schröder and Hofmeier in favor of partial removal or palliation.

As to the technique of vaginal hysterectomy, it would seem that the methods of Martin, Leopold and Fritsch, and the recent suggestions of Richelot to secure the broad ligament with clamp forceps, thus saving the time and difficulty of ligating those structures, left little to be desired in this direction. There can be no question that the more rapidly the operation is performed, and the less the quantity of blood lost, the better will be the patient's chances of recovery. It is the rapid and skilful operating of those gynecologists, chiefly Germans, who have published tables of such brilliant successes, that has contributed mainly, in my opinion, to the results which they have had. If this is true, it follows that the operation is destined to be limited to men of exceptional ability as anatomists and surgeons. For such

it is, doubtless, an easy operation, but it can never be to those who are unfamiliar and unpractised in operations in a deep cavity like the vagina.

With regard to the element of time which may elapse between a vaginal hysterectomy and a possible recurrence of the disease, it does not seem to me that the question has been fairly argued by all the opponents of the operation. One point after another of their opposition has, however, been wrested from them. It was first the unusual difficulties of the operation that were urged against it, then the unwarrantable exposure to secondary hemorrhage and dangers of septic infection, and finally it was declared useless because the disease always recurred. If we allow this last charge to include abdominal hysterectomy as well as vaginal, at least one brilliant case can be cited to controvert it; a case which was operated upon ten years ago by Prof. W. H. Freund, and in which, at a recent date, there had been no recurrence. Such a case could fairly be considered cured. There is no doubt, in my mind, that the operation is in very many cases justifiable, and that it will continue to be so regarded if it can offer, as it certainly can, to the large majority of those who are considered proper subjects, immunity for one, two or three years. The constantly improving statistics teach very clearly that we may hope for something even better than this in the near future.

If this operation be compared with that of amputation of the breast for malignant disease, and scarcely any one will question the propriety of the latter, it will be found that the results are favorable to hysterectomy. Martin in his paper before the Ninth International Medical Congress (*loc. cit.*) stated that Küster had, in 1883, reported 778 cases of breast amputation with a mortality of 15.6 per cent., while his own table of 311 cases of vaginal hysterectomy, including the work of Fritsch, Leopold, Olshausen, Schröder, Staude and Martin to the end of 1886, showed a mortality of only 15.1. It will readily be admitted that too much stress should not be laid upon these statistics, for the gynecologists mentioned are among the best in the world, and their work in the field of hysterectomy is the very best that has been done, and merely represents the possibilities of the operation, not what is achieved by the average of those who practise it.

The question of recurrence should not have more influence than it does with those other forms of malignant tumors which deform and disfigure various parts of the body, but especially the head and face. There are few skilful surgeons who will decline to remove such, and yet they present all the objections which have been urged against vaginal hysterectomy. Whatever the skill of the operator, however, I believe there are more limitations to the operation than have generally been laid down. I would not take the extreme position of my friend, Dr. Reeves

Jackson, and condemn the operation *in toto* (see discussion on A. Martin's paper on "Vaginal Hysterectomy," *Transactions of the Ninth International Medical Congress*, Section on Gynecology), nor do I think that for so grave an operation Martin's and Schröder's indications are broad enough, namely, that the uterus should be freely movable and sufficiently small, the vagina sufficiently capacious and the circum-uterine tissues without evidence of infiltration to the examining finger.

It is only repeating what has been said many times to state that the examining finger, no matter how well trained, is liable to be deceived in this matter. A case is recalled in which excellent diagnosticians recommended Freund's operation, but when the operation was performed the posterior wall of the bladder was found so infiltrated as to break down like wet paper. Lancereaux has stated that kidney disease always exists in cases of uterine cancer which have attained any extent, and in my own experience I do not remember to have seen a case of advanced uterine cancer in which advanced kidney disease did not coexist, as shown by autopsy. I am not aware that any one has yet ascertained the precise or proximate stage of cancer of the uterus when the kidneys become involved.

If we limit the field of the operation strictly to those cases in which it can be demonstrated that the uterus alone is involved, we may rest assured that it will be performed less frequently than it now is, for in the majority of cases the attention of the patient is not called to her condition until severe symptoms occur, and then lymphatic involvement has usually taken place to a greater or less extent. In the case which is here reported it was considered that the disease was limited to the uterus, but, as the pathologist's report shows, it had invaded one broad ligament and the contiguous pelvic lymphatics to a slight extent, but sufficient, no doubt, to have served as a focus for further infection. The contra-indications to which particular attention was to be called will be referred to in the following history, and in the accompanying paper of Dr. W. H. Porter.

The patient was kindly referred to me by Dr. C. E. Bruce. She was a native of France, fifty-four years of age, and ceased menstruating at the age of forty-eight. She had had two children and two miscarriages, at the fifth and sixth months respectively. All her labors had been accompanied by severe hemorrhage. Her last pregnancy was during her thirty-sixth year. A year before she came to me she began to suffer pain after coitus, and at such times there was also a slight serous or sero-sanguinolent discharge. At various intervals during this year there were also rather free hemorrhages. Within two weeks of my seeing her she began to have severe pain in the hypogastrium and frequent desire to urinate. Her bowels were constipated, and straining at stool excited bleeding. The uterus was small and

movable, the cervix being hard and contracted, and free hemorrhage was excited by very gentle manipulation, although the latter caused no pain. A sound could be passed only a very short distance into the uterine canal. The examinations were made in both the dorsal and the lateral positions, and it could not be ascertained that either the vagina or the circum-uterine tissues were implicated. In fact, it seemed to be an entirely suitable case for hysterectomy. That operation was performed April 18, 1887, and while I doubt not that it would have proved sufficiently easy for a more experienced operator, it was for me exceedingly difficult, and of very long duration. There are certain delays in a first operation of this character which cannot be foreseen, and in view of such possible accidents as ligation of the ureters, rupture of the bladder and injury to the intestines, it is better to proceed slowly and avoid great risks.

The day following the operation the patient did fairly well, passing only four ounces of urine, however, which contained pus, blood, eight per cent. of albumin and granular casts.

On the second day the urine was more abundant and of better quality, but the stomach began to be rebellious, and the mind unsteady. The temperature did not exceed $100\frac{1}{3}^{\circ}$ F., and the pulse was steady at about 100 and of fair quality.

The third night was a very restless one, and the patient was wildly maniacal. Thinking that the symptoms might be due to iodoform poisoning, the wound having been freely dressed with that substance, and the vagina packed with iodoform gauze, I removed the tampon, when the patient at once fell asleep. On awaking, the delirium and restlessness returned, the respiration being markedly irregular and varying between seven and fourteen per minute. The urine was drawn every eight hours, as much as four ounces being obtained at a time, and thus continued during the subsequent twenty-four hours. At 8 P. M., on the evening of the third day, the temperature was $102\frac{1}{4}^{\circ}$ F., and the pulse 108 and of fair quality. The patient was quiet, but subsequently became delirious and remained so during the night.

Near the end of the fourth day heart failure came on, and death resulted on the fifth day.

It is not a pleasant duty to relate one's fatal cases, but it seemed proper in this instance, especially inasmuch as a careful autopsy was made, which resulted in the discovery of very interesting conditions. No metastases of the disease were found in the viscera, but the question is very pertinent whether, with such lesions as were present, aside from the cancerous disease, there would be very much hope of performing a successful operation. On the other hand, the lesions were obscure, and certainly were not suggested by the patient's history. Perhaps it is more accurate to say that they were overshadowed by her uterine disease. At all events, the case proves that in forecasting the probable result of an operation of this character, there is room and necessity for more thorough preliminary examinations than are usually made.

In this case the autopsy showed that the heart was not in condition for the strain which was required. Bramwell (*Diseases of the Heart*, Edinburgh, 1884, p. 649) simply records a matter of common clinical observation in stating that "persons whose hearts are fatty bear pain badly, and are unfavorable subjects for severe operations," and Da Costa (*Medical Diagnosis*, Philada., 1884, p. 408) observes that fatty degeneration of the heart is one of those disorders with the anatomical characters of which we are far better acquainted than with their clinical history; also, "there is as yet no sign discovered by which we can positively say that the dangerous disorganization of the muscular fibres of the heart is in progress." The condition of the liver in this case was also unfavorable for a successful issue. The co-existence of the fatty and cirrhotic conditions is interesting, and it is a wonder that the patient's general condition, prior to the operation, was so good with such a combination of lesions.

Dr. Porter considers that the kidney lesions in this case were the principal cause of death (see his subjoined paper), which lesions he thinks were developed subsequent to the operation. May it not be that the fatty and granular changes in the epithelium of the uriniferous tubules formed a portion of the process of fatty infiltration which involved the liver and heart. The weakened condition of the heart-muscle certainly militated seriously against the distributing power, favoring venous stasis; destruction of a large area of liver surface interfered seriously with the metabolic function of that organ, and the imperfect aëration of the blood and oxidation of its oxidizable elements which necessarily resulted, would seem to account for the toxæmia which was probably present as early as the second day, and, from the nature of the conditions, must necessarily become more and more intense.

Under these circumstances the increased labor which was required of the kidneys, which were already weakened by disease, or, at any rate were predisposed to it, could not fail to produce acute inflammatory symptoms, and yet their function was by no means destroyed, for until the last few hours of life they were secreting a not inconsiderable quantity of urine.

Under all these conditions, it cannot be considered strange that the operation resulted fatally. The lesions, in my opinion, were sufficient to contraindicate the operation; but whether one would be able to discover such lesions in any given case, even after the most careful physical and chemical examinations, is a matter which may be seriously doubted.

Necropsy twelve hours after death. Body abundantly supplied with adipose tissue. Rigor mortis marked.

Thoracic cavity. The pericardial sac contained

about one-half ounce of clear, straw-colored serous fluid.

The *heart* was slightly enlarged and infiltrated with fat. The muscular tissue was pale, soft and somewhat granular. The segments of the mitral and aortic valves were the seat of a moderate amount of fatty infiltration, but the valves were free and apparently competent.

The *aorta* was the seat of marked fatty infiltration and commencing atheroma.

The *lungs* were slightly bound to the chest wall, deeply pigmented, congested and oedematous.

Abdominal cavity. The spleen was slightly enlarged and softened. There was no evidence of any hemorrhage into the peritoneal cavity, nor about the stump left by the operation. Everything about the stump indicated the development of a favorable reparative process.

The *kidneys* were enlarged, pale in color and very soft. Their capsules were not thickened or adherent, and the underlying renal surface was perfectly smooth after enucleation. Both the cortical and medullary portions were enlarged and whitish in color. *Microscopic examination* showed the epithelial cells of the uriniferous tubules throughout the kidney to be very much swollen, and their protoplasm filled with minute granular and fatty particles common to a rapidly progressing granular and fatty metamorphosis of the kidneys. The intertubular tissue was swollen and oedematous, but there was no development of new interstitial tissue. A few hyaline, granular and fatty casts were found in the tubules of the Malpighian pyramids.

The few minims of urine removed from the bladder at the necropsy were loaded with albumin and casts.

The *liver* was in an advanced state of fatty infiltration, and there was a parenchymatous metamorphosis of the protoplasm of the hepatic cells, unaffected by the fatty change. There was also a slight amount of interlobular cirrhosis.

Death in this case was due to the rapidly developed parenchymatous metamorphosis of the kidneys which caused a uræmic toxæmia followed by cardiac paralysis.

A careful *macroscopic examination* of the stump of the operation showed that all the ligatures were in position, and had not slipped. A thorough *microscopic examination* of the tissues behind the stump revealed the fact that all the carcinomatous tissue had not been reached by the operation. Marked alveolar spaces irregularly packed with epithelial cells having no intercellular substance were found in the retro-peritoneal tissue. The lymph spaces were also distended and contained epithelial corpuscles, also indicating a general spread of the morbid process.

The results of the necropsy would indicate a successful operation, so far as the operative procedure was concerned, all the growth having been removed that could possibly be reached by the knife. The stump being perfectly secured by the ligatures, hemorrhage had been prevented. There was no evidence

of peritonitis, and the stump indicated a favorable reparative process. The chief point of interest, however, was in the rapidly developed parenchymatous metamorphosis of the renal organs (for explanation of the manner in which this change is produced, see Porter *On Renal Diseases*, p. 77, New York, 1887).

It might be well to say, in addition, from a further study of the subject, that in all the fatal cases of a similar nature to this one reported by Dr. Currier, in every instance marked hepatic lesions were found at the necropsy. In those cases in which the urine was carefully analyzed prior to the operation, and found free from albumin and casts, the quantity was found to be diminished, the specific gravity high, the color very dark, the reaction strongly acid, and the microscope revealed an abundant deposit of uric acid, urates, oxalates, one or all combined. These, from a physiological standpoint, indicate a decided hepatic disturbance, either functional or organic in nature. In all the cases examined post-mortem there were found marked organic changes in the liver as well as in the kidneys.

From these positive clinical and pathological facts the following deductions have been established:

First. That with a scanty flow of urine, which is high colored, of a high specific gravity, strongly acid in reaction, and loaded with uric acid, urates or oxalates, one or more combined, even with the absence of albumin and casts from the urine, we may reasonably expect to find, upon post-mortem examination, marked organic changes in the liver and kidneys.

Second. That these cases bear prolonged etherization and surgical operations badly; that they are the cases most likely to develop acute parenchymatous metamorphosis of the kidneys; and that they frequently die from retained excrementitious products rather than from so-called septicæmia.

Third. That a superficial test for albumin and casts is not a sufficient guide to the advisability of operation and to the prognosis in every surgical procedure. But for accuracy a careful study must be made, as regards quantity, specific gravity, acidity and the microscopic crystalline deposits, otherwise, the hepatic lesions may be overlooked. These conclusions are the results of a careful study of a large number of this class of cases in which necropsies were made.

MEDICAL PROGRESS.

Pulsating Tumors of the Spleen.—Arterial changes sometimes assume a prominent rôle in cases of aortic insufficiency. To these abnormal manifestations in the vascular system belongs also the so-called pulsating tumor of the spleen, which occurs under peculiar conditions, and perhaps oftener than has hitherto been known. Gerhardt called attention to the manifestation six years ago, and Prior last year discussed the subject. This exhausts the

literature. Prior showed that Tulpus, already in 1652, had described the condition as *lien verberens*; since which there has been no other description of the phenomenon. DRASCHE (*Wiener medicin. Blätter*, 1888, No. 1) has carefully studied a case of pulsating tumor of the spleen, so that six cases are now recorded. Five (Gerhardt, Prior, Drasche) occurred in patients with aortic insufficiency, and one (Prior) in an individual with hypertrophy of the left ventricle, without valvular lesion. In all six at the time of the manifestation there was fever from concurrent typhus, intermittent, pneumonia and pericarditis. The abnormal blood pressure, in consequence of the hypertrophy of the left ventricle, and the febrile relaxation of the vessel walls, which together give rise to increased size of the spleen, are the two conditions which afford an explanation of the occurrence of such pulsating tumors. The more frequent occurrence of such tumors with aortic insufficiency is explained by the constantly accompanying and usually marked hypertrophy of the left ventricle; that it is immaterial whether the hypertrophy of the left ventricle is due to aortic insufficiency or is a result of a demand for increased work on the part of the heart is self-evident; it is only requisite (Prior) that the hypertrophied ventricle, notwithstanding the fever, act powerfully and energetically. Drasche's work confirms and strengthens the existing views on the subject. — *Centralbl. für klin. Medizin*, June 30, 1888.

Pomade Against Neuralgia.—

R.—Menthol gr. xv.
Cocaine gr. v.
Hydrate of chloral gr. iij.
Vaseline 3j.—M.

Atropine in Poisoning by Pilocarpine.—At a meeting of the Medical Section of the Association of Polish Naturalists, DR. BOLESŁAW WICHERKIEWICZ (*Wiadomości Lekarskie*, No 7, 1888) related the case of a woman, aged forty, in whom the hypodermic injection of a sixth of a grain of pilocarpine was followed by profuse salivation and perspiration, by persistent nausea and vomiting, by incontinence of urine and feces, by extreme pallor of face, cyanosis of the lips, immobile contraction of the pupils and great acceleration of the pulse. Subsequently, there supervened frequent prolonged arrests of the pulse and spasms of the posterior cervical muscle, accompanied with rolling of the eyeballs upward and loss of consciousness. The administration of morphine, strong infusion of black coffee, alcohol and amyl nitrite failed to relieve the symptoms. The patient's condition growing more and more alarming, ten hours after the pilocarpine injection, one-fiftieth of a grain of atropine was injected hypodermically. A striking general improvement took place almost immediately. In fifteen minutes her pulse became quite regular (eighty per minute), the pupils dilated, the respiration normal, sickness and spasms disappeared tracelessly. Two hours later the lady was found to be "quite free from symptoms and smiling." — *Provincial Med. Journ.*, July 2, 1888.

The Treatment of the Morphine Habit.—Most of the disturbances following the withdrawal of morphine appear to be due to inanition from impaired digestive activity, anorexia, vomiting, profuse diarrhoea and obstinate in-

somnia. If the digestive disorders are prevented or lessened, the danger of the withdrawal of the drug is removed. From personal observation, KACZOROWSKI (*Medycyna*, 1887, Nos. 28 and 29) recommends the following: After the sudden withdrawal of morphine, opium is to be administered: Tinct. opii, 20 parts; tinct. iodi, 2 parts; twenty drops to be taken every two hours, day and night. The opiate partially takes the place of the withdrawn morphine, and the iodine, as an antiferment, maintains the appetite and makes possible normal and efficient digestion; vomiting and diarrhoea are rare; the symptoms of deprivation are mild and harmless. The dose is gradually reduced to nothing, and the cure is soon complete. Confinement is not necessary, as the compulsory cure thus forcibly effected is not permanent. Constant observation is indispensable, but the psychical influence is not less important. Well-conducted hospitals are best adapted to carry out the treatment, especially in the hands of a patient and reliable female nurse. To prevent the diffusion of the morphine habit, it is necessary that physicians personally make any necessary hypodermic injections, and that they abstain therefrom in their own persons. — *Centralbl. für klin. Medizin*, June 30, 1888.

The Treatment of Fissured Fractures of the Os Calcis.—

GUSSENBAUER, before the Verein Deutscher Aerzte of Prague, stated that though fractures of the calcaneum from direct force, as from falls upon the heel or from heavy weights, are uncommon, fissured fractures are so rare that but few cases of the kind are recorded. They are especially interesting to the surgeon from the difficulty of a safe method of treatment.

In a recent case, the speaker adopted a new procedure, which, for simplicity and safety, deserves preference over other methods. A robust man, aged forty-nine, on January 12th, fell into an excavation three feet deep, throwing the right foot forward and landing on the point of the foot, and fractured the os calcis. As the attending physician could not effect replacement, the patient, on January 13th, came to the clinic. There was marked swelling in the region of the right astragalo-calcaneal joint and of the lower third of the leg; strong plantar flexion was impossible; dorsal flexion painful; the tuberosity of the os calcis was raised two inches by the tendo Achillis, which separation was increased to three inches and a half on dorsal flexion. Reduction was attempted under chloroform anaesthesia. By maximum plantar flexion at the tibio-tarsal joint and flexion at the knee-joint, the dislocated tuberosity could be brought in partial apposition with the anterior fragment, but complete reduction was not possible. A retaining bandage was applied. Bony union was not looked for. Coaptation of the fragments would have been possible with Achil-lotenotomy, but the retention of the tuberosity in position could only have been accomplished with protracted immobilization of knee- and ankle-joints. Hereupon, Gussenbauer suggested the following expedient: The broken fragment of bone was drawn down by a Langenbeck bone hook fastened into the os calcis, by which means the fragments were accurately approximated. Then a triangular nail was drawn through the skin into the calcaneum, and such firm union of the fragments effected that the patient could make varied movements of the ankle-joint without the slightest displacement. An iodo-form dressing was applied over the site of entrance of

the nail, and the foot placed upon a Petit splint. In fourteen days, the patient could move the foot without pain; in six weeks, there was complete consolidation of the fragments, and the nail was removed. The patient was discharged February 26th, without the slightest interference with function. He has since resumed his occupation of restaurateur.—*Wiener medicin. Presse*, July 1, 1888.

Antiseptic Ointments for Vaginal Touch or for Dressing Excoriations, Fissures, etc.—DEMELIN, in *Revue Générale et de Thérapeutique*, June 28, 1888, recommends the following:

R—Vaseline	30 parts.
Boric acid finely pulverized	4 "
R—Vaseline	120 parts.
Biniodide of mercury	1 part.
R—Vaseline	30 parts.
Finely powdered iodoform or iodol or salol	4 "
R—Vaseline	30 parts.
Creasote	1 part.
R—Olive oil	100 parts.
Crystallized carbolic acid	10 "

The carbolized oil is advantageously employed in lymphangitis of the breast.

The Surgery of the Biliary Passages.—COURVOISIER (*Korresp. Bl. für Schweizer Ärzte*, 1888, No. 3) formulates the following indications:

In case of hydrops or empyema of the gall-bladder, in consequence of occlusion of the cystic duct by a calculus, lithotripsy through the duct wall should first be attempted; this failing, cholecystotomy, with suture and depression of the gall-bladder, should be performed. If the cystic obstruction cannot be overcome, an artificial gall-bladder abdominal fistula is indicated; cholecystectomy might even be considered.

In case of complete and persistent occlusion of the choledoch duct with the consequences of biliary retention, when the obstructing agent is a stone, lithotripsy is to be attempted. If this fail, or if the obstruction depend upon cicatricial growth, an artificial gall-bladder intestinal fistula should be made.

Acute ulcerative perforation of the biliary passages by a calculus demands a laparotomy and search for the perforation. If the perforation is found in the cystic duct, ligature of the peripheral portion and extirpation of the gall-bladder are to be done; if in the choledoch duct, a ligature should be placed on either side of the perforation, and an artificial gall-bladder intestinal fistula made. A similar procedure is indicated in rupture of the biliary passages. Derangement of the biliary excretion by new growths calls for cholecysto-enterostomy.—*Centralblatt für Chirurgie*, June 30, 1888.

Injections of Ether in Cardiac Insufficiency.—BAMBERGER (*Wiener kl. Woch.*, No. 12) relates that in a case of fatty degeneration of the heart the hypodermic injection of several syringefuls of ether overcame the extreme dyspnoea and the cedema, and caused a profuse secretion of urine. The writer believes that in this case the ether

acted directly upon the renal secretory apparatus.—*Münchener medicin. Wochenschr.*, July 3, 1888.

The Etiology of Yellow Fever.—DR. PAUL GIBIER, who was deputed by the French Government to investigate the whole question of yellow fever, has just delivered a lecture before the Academy of Sciences in Havana, embodying the results at which he has at present arrived. Before leaving Paris, he felt so convinced of the truth of Dr. Freire's views that he got himself inoculated with some of the cultures which that distinguished Brazilian physician had brought. The first insertion—made with a lancet with great care—was followed by no result whatever. A week later some of the attenuated virus was injected subcutaneously, and this produced such violent effects that Dr. Gibier declares nothing in the world would induce him to submit to a repetition of it.

Since his arrival in Cuba, he has made post-mortem examinations of a number of persons who have died of yellow fever, some of the examinations taking place only two hours after death, and one of them within fifteen minutes from the moment life became extinct. The examination of the blood taken from the heart in these cases, as well as the inspection of the urine, the bile, the pericardial fluid, the liver, the spleen and the mesenteric glands convinced him that none of these organs contains any microbes. He, however, discovered in the black matter always found in the intestines a bacillus presenting many points of resemblance to the so-called comma-bacillus of cholera, being sometimes curved and occurring in some cultures in a spiral form, possessing also the property of liquefying gelatin. This bacillus, when cultivated in peptonized broth, blackened the sides of the tubes; and when a few drops of the culture were injected into the intestine of guinea-pigs it sometimes proved fatal, the intestinal contents then showing a great resemblance to those found in yellow fever patients. In dogs, the injection of a few drops into the small intestine rapidly produced violent effects—vomiting, diarrhoea and, the night following, pyrexia. Cultures of this bacillus had a smell resembling that of the black vomit. A moist heat of 140° F. destroyed the bacillus in a few minutes; desiccation also proved fatal to it in less than twenty-four hours.

This last observation led Dr. Gibier to suggest that if this bacillus was really the cause of yellow fever, the immunity of inland districts might thus be explained, the comparative dryness of the air destroying the virus. It developed extremely well in sea water charged with organic matter; living, too, for a long time side by side with the ordinary microbes of putrefaction, so long at least as the medium did not become acid, for even a very slight degree of acidity destroyed the organism in a few hours.

In confirmation of observations made in the laboratory, Dr. Gibier mentions that he has several times had an opportunity of demonstrating the same circumstance in the dead-house, the contents of the intestines, when they have become acid some hours after death, ceasing to show the presence of the bacillus.

Since writing on this subject previously, Dr. Gibier has had opportunities of examining the bodies of foreign sailors who have died in the civil hospitals of Havana, and he has been able to demonstrate the presence of the bacillus in those who had suffered from yellow fever and its absence in those who had died from other diseases.

His opinion is that yellow fever is due to the development of the microbe in the intestine, the affection being, therefore, essentially a local one.

As to treatment, in addition to tonics and stimulants when required and frictions for the renal complication, he advises that the main treatment should be directed to the intestine. Every morning a good purge should be given—the first day 1 to 1½ ounces of sulphate of soda; the second day, 1½ ounces of castor oil, and the third day 15 grains of calomel, the same series being repeated during the rest of the first week. If the medical man is only consulted on the fourth, fifth or sixth day, the stomach should be washed out previously to the administration of purgatives, the colon being subsequently irrigated with a special tube, in order to get away as large a quantity of the toxic matter as possible. A case is mentioned which was apparently hopeless, the patient being semi-comatose, in which an enema produced an extremely copious stool, followed by rapid improvement and ultimate recovery. In fact, Dr. Gibier would treat yellow fever as he would an infecting ulcer, "by washing and disinfection." He recommends in addition to hydrochloric acid lemonade, which is taken as a drink, three different mixtures, all to be taken together. 1. Perchloride of mercury, $\frac{5}{8}$ to 1 grain; brandy, 2 ounces; mucilage, 2 ounces; infusion of coffee, 5 ounces; the whole to be taken in numerous divided doses during the twenty-four hours. 2. Naphthalin, 7½ grains, made up into a paste; from five to ten times this quantity to be taken in the twenty-four hours. 3. Tannic acid, 7½ grains, made into a paste; to be taken from six to ten times in the twenty-four hours. A case is given in detail, in which this treatment immediately changed the aspect of an apparently very grave case, the patient making a good recovery.—*Lancet*, July 14, 1888.

Excision of a Large Portion of the Os Ilium.—GUSSENBAUER, before the Verein Deutscher Ärzte, in Prague, exhibited a woman, aged forty-six, in whose case a large portion of the right ilium had been removed on account of an enchondroma. Following an injury in the right iliac region, a swelling formed, which grew rapidly, was painful and impeded locomotion. When the patient was first seen, on February 20th, a nodular tumor of the size of an adult's head and of the consistency of cartilage was detected in the right half of the pelvis, occupying the right os ilium, and extending from the sacro-iliac synchondrosis deeply into the iliac fossa. On February 23d, the extirpation of the tumor and of the involved portion of the os ilium was performed. The large cavity made was drained. The wound healed kindly. The bandage produced compression of the ascending colon, in consequence of which, tenderness, hiccough and constipation arose, disappearing, however, after removing the cause.—*Wiener medizin. Presse*, July 1, 1888.

The Cardiac Insufficiency of Fatty Heart.—HÖGERSTEDT (*Petersburg med. Wochenschr.*, Nos. 47 and 48, 1887) states that in this there are two distinct therapeutical indications: 1. The treatment of the acute manifestations of cardiac failure; 2. To overcome the chronic insufficiency. To meet the first of these, he advises the use of ether and alcohol. With the onset of the asthmatic paroxysm, he recommends an ice bag to the cardiac region, peripheral irritation by means of friction and hot applica-

tions to the extremities, a glass of wine and the subcutaneous injection of ether or whiskey. Should these measures fail, and danger of cardiac paralysis arise, then only should resort be had to digitalis. The author warns against the use of morphine and, especially, of opiates. Their usefulness is slight, and they may do harm by increasing the feebleness of the heart.

For the chronic insufficiency of the heart, the author recommends an absolute milk-diet. Such a diet is unfavorable to the formation of fat. It supplies the organism with sufficient for its needs, but with a deficiency of carbohydrates and fat. With a continued milk-diet the signs of chronic insufficiency, as far as possible, are made to disappear, and the force of the heart is increased. It is probable that the reduction of fat which affects the body also includes the heart.

In his case the author used with good results one drop of a one per cent. solution of nitroglycerin.—*Centralbl. für die gesammte Therap.*, July, 1888.

Sulphonal.—LEHMANN (*München. medicin. Wochenschr.*, July 10, 1888) relates the case of a patient with asthma and insomnia, in which, chloral and morphine failing, fifteen grains of sulphonal given at bedtime proved an excellent and agreeable hypnotic.

MARTIN (*Med. Neuigkeiten*, No. 29) recommends sulphonal for the night sweats of phthisis. Doses of seven and a half grains at bedtime prove serviceable and afford the patient a quiet and natural sleep of four to six hours.—*München. med. Woch.*, July 10, 1888.

Cold Air Inhalations in Phthisis.—As the bacillus tuberculosis is only developed at a temperature above 37.5°, WORMS, of Riga (*Petersb. med. Woch.*, No. 25), recommends inhalations of cold air in phthisis. The patient, protected from the wind, should deeply inhale the external air through the mouth during the greater part of the day; during the night, the room is to afford limited access of cold air. Loss of heat by the skin is to be prevented by warm clothing. At the same time abundant albuminous and oleaginous nutriment and some alcohol are to be given; physical exercise and pulmonary gymnastics are to be recommended. Unfortunately, there are no statistics to support the author's theory.—*München. medicin. Wochenschr.*, July 18, 1888.

Staining of Bacilli in Tuberculosis.—Tubercle bacilli are readiest and best stained by Gabbett's method, as described by GÜNTHER in the *Wiener klin. Woch.*, No. 13.

I. The dry preparation is placed for two minutes in a solution of fifteen grains of fuchsin in three and a quarter ounces of a 5 per cent. solution of carbolic acid and two drachms and a half of absolute alcohol.

II. The preparation is then placed for one minute in a solution of thirty grains of methyl-blue in three and a quarter ounces of sulphuric acid. The preparation is next rinsed in water and examined in this medium; or, better, is treated with absolute alcohol and examined in Canada balsam. The bacilli are red, the field blue.—*München. medicin. Wochenschr.*, July 10, 1888.

For Metrorrhagia.—According to BAMBELON (*Pharmac. Centralhall*, No. 9), a decoction of one to two teaspoonfuls of Capsella Bursa Pastoris or Shepherd's purse is equally as efficient in metrorrhagia as ergotin.—*Deutsche medicin. Wochenschr.*, July 12, 1888.

THE MEDICAL NEWS.

A WEEKLY JOURNAL OF MEDICAL SCIENCE.

COMMUNICATIONS are invited from all parts of the world. Original articles contributed exclusively to THE MEDICAL NEWS will be liberally paid for upon publication. When necessary to elucidate the text, illustrations will be furnished without cost to the author. Editor's address, No. 1004 Walnut St., Philadelphia.

SUBSCRIPTION PRICE, INCLUDING POSTAGE,
PER ANNUM, IN ADVANCE \$5.00.
SINGLE COPIES 10 CENTS.

Subscriptions may begin at any date. The safest mode of remittance is by bank check or postal money order, drawn to the order of the undersigned. When neither is accessible, remittances may be made, at the risk of the publishers, by forwarding in registered letters.

Address, LEA BROTHERS & CO.,
Nos. 706 & 708 Sansom Street,
PHILADELPHIA.

SATURDAY, AUGUST 4, 1888.

PERNICIOUS ANÆMIA.

THAT pernicious anæmia is one of the most obscure diseases is due not only to the short time it has been studied but, to a greater degree, to the variety of its symptoms. From the diversity of these in different cases, it is difficult to recognize the type, and until this is done, the question as to whether pernicious anæmia is really an independent disease or not must remain an open one. At present the mass of testimony, or, at least, of opinion, tends to the belief that it is an independent disease, but with a varying etiology; and as the latter factor is studied the disease can be divided into cases with and cases without a known cause. In time this will probably tend to lessen the number of cases described as essential anæmias.

Before that, much study must be devoted to single symptoms and defining their relation to the disease. The difficulty of such a study is illustrated by a recent paper by TRECHSEL, on the "Etiology of Progressive Pernicious Anæmia" (*Rev. med. de la Suisse Romande*, No. 6, 1888), which contains a very good account of the disease and the discussion of a case under the author's observation, which he considers as presenting symptoms of locomotor ataxy. The case was that of a young woman who became anæmic during pregnancy, was delivered normally and without much hemorrhage, but never recovered strength; her appetite was lost, vomiting occurred frequently and the patient so lost strength

that she could not walk. The knee-jerk was diminished, as was the muscular sense and also, though to a less degree, the cutaneous sensibility. Toward the end, lightning pains came on. There was no autopsy.

In citing this case as one of tabes, Trechsel says that Lichtheim has reported two similar cases, in which degeneration of the posterior columns of the spinal cord was found, and he states his belief that there was a fatty degeneration of these columns similar to that found in other organs in pernicious anæmia. He admits, however, that Lichtheim did not pronounce upon that point; and it seems to us a mistake on his part that he did not follow that acute clinician's example; for there is evidently little ground, from the clinical history as detailed, to warrant the diagnosis of tabes. The knee-jerk was diminished, but not absent, and we learn nothing about the pupils, ataxia or Romberg's symptom. The hæmoglobinometer estimation is useless as bearing on the diagnosis of pernicious anæmia, a fact of which the writer appears to be ignorant, if we may judge from his remarks on the diagnosis. He says that the hæmoglobin "seems to be in proportion to the red corpuscles," a statement inconsistent with the facts, as the relative increase of hæmoglobin above the proportion of the corpuscles is one of the most marked characteristics of this form of anæmia. Thus it seems doubtful that Trechsel's case was really one of pernicious anæmia; so that our knowledge of the disease is no greater than before.

To return to tabes, even more marked cases than this have been reported, in which no lesion at all in the cord could be made out *post-mortem*. It is difficult to understand, too, how or why the cause of the fatty degeneration of the other organs, presumably anæmia, could produce such systemic degeneration as that characteristic of tabes.

LEAD ENCEPHALOPATHY.

THE cerebral disturbances due to lead poisoning are among the rarest of all nervous diseases. Partly owing to the scant opportunities offered for making *post-mortem* examinations in such cases, but little is known of the anatomical changes underlying the morbid conditions. Lead is found in the nervous as in many other tissues; Kussmaul and Maier have described periarteritis in the cerebral cortex, and sclerosis of the sympathetic ganglia; the latter fact was already known to Tanquerel in 1842. In cases in which death has ensued during eclamptic seizures,

aside from hemorrhage in the pons in one case of Lemaire, nothing more was noted than anæmia and œdema, which, of course, are not peculiar to the disease. That the anatomical changes are not simple may be concluded from the variety of forms presented clinically. Our readers will no doubt recall the interesting paper by Dr. Stewart, in *THE MEDICAL NEWS* of last year, in which many of the cases presented eclamptic phenomena; and this is the commonest form of plumbic encephalopathy.

WICKHAM (*L'Union Medicale*, No. 80, 1888) has reported a case in which progressive paralysis was apparently initiated by lead poisoning. The patient was an artist in water-colors, thirty years of age. There was no syphilitic or alcoholic history, but he belonged to a neurotic family. His disease began in the spring of 1887, with disturbed intellection, irritability and trembling of the fingers. This increased so that at the end of the year he had to give up work. He was seen then by Dr. Wickham, cachectic and with the symptoms noted, and with a blue line on the gums. It appeared that he used white lead in his work, wetting the brush in his mouth and rubbing off the color with his fingers.

Gastro-intestinal symptoms soon followed, and later albuminuria. His mental condition became worse. Loss of memory was marked; he would spend hours arranging furniture in the dwelling; believed that he was about to invent a process for engraving that would make him wealthy; he had periods of "reasoning mania." His speech became stammering. At no time, however, was there lingual ataxia, trembling of the lips or pupillary disturbance. Incontinence of urine or feces and alteration of knee-jerk were also absent. He was studied by Charcot, who was struck by the difference between the man's general appearance and his writing. The latter was so perfectly characteristic of general paralysis that he made a diagnosis to that effect, with intercurrent lead poisoning. The treatment consisted in the use of sulphur baths, iodide of potassium and morphia. There was but little change until February, when improvement of the gastro-intestinal symptoms began, soon followed by improvement of the mental and nervous symptoms. In April the patient was declared well. He could write as in health, and both mind and body seemed perfectly normal.

If, as Wickham remarks, the diagnosis of Charcot be accepted, the patient must now be in a period of remission, but in such remissions there is rarely com-

plete absence of psychical as well as physical symptoms, even for so short a time as that elapsing before the case was reported. If the diagnosis of general paralysis is rejected, it is difficult to doubt the existence of a saturnine pseudo-paralysis, a disease curable by eliminating the toxic substances. It is possible, also, that the case is one of lead poisoning in a neurotic, in which cerebral symptoms and tremor preceded colic, and in which acute mania supervened.

Whichever of these the case proves to be, it shows forcibly the difficulty of diagnosing progressive paralysis, and more forcibly still the necessity for a guarded prognosis, even when the diagnosis seems assured.

THE PREVENTION OF FOOD ADULTERATION.

THE administration of the laws of New Jersey to regulate the sale of oleomargarine and other imitations of dairy products and to prevent the adulteration of food and drugs has recently been entrusted to Dr. WM. K. NEWTON, Dairy Commissioner of the State, in order to impart to it increased efficiency, and the result has justified the expectation. The report of the Commissioner for 1887 furnishes evidence of intelligent and energetic work, in detecting adulterations in articles of food, and in punishing the offenders. The enforcement of the law regulating the sale of oleomargarine and other imitations of dairy products has well nigh driven these articles out of the market. The act to prevent the adulteration and to regulate the sale of milk, passed several years ago, has been made operative in nearly all the cities and towns of the State, with the result of greatly improving the quality of this important article of food. The law relating to the adulteration of food and drugs, which up to the present time had been a dead letter, has been revived, and a large amount of labor has been expended in analyzing the more common articles. When these articles have been found adulterated, the dealers have been warned of the fact and served with a notice that a repetition of the offence would be followed by prosecution. New Jersey has thus placed herself in line with Massachusetts, New York and some other States, in making open and active warfare against the deceptive and fraudulent and, frequently, hurtful practice of adulteration.

These organized efforts at the suppression of an infamous practice are, as yet, in their infancy, but they have already accomplished excellent results, a

large part being due to the moral effect of organization under efficient laws. Other States will eventually establish a service of food inspection and analysis, when its necessity is better understood and its advantages are more thoroughly appreciated.

The adulteration of food may be harmless, in which case an imposition is practised upon the purchaser, who pays for what he does not want, besides obtaining an article deficient in nutritive value; but a more serious aspect of the subject is that in which hurtful or poisonous materials are added to food, as in the recent cases of poisoning from the admixture of chrome yellow in certain products of the bakehouse, which fact was accidentally discovered after fatal consequences had attended the use of the toxic agent. It is true that the law punishes the offender when serious effects are traced to his acts, but the aim of the law should be protective and preventive, as well as remedial, and by the authorization of well-known agencies it should discover and punish the offence of tampering with the food supplies of the people. The protection and preservation of the health and lives of the people belong to the highest duties of government, and unless this truth is realized by our legislators, and they use their opportunities for thus promoting the public good, they become, in a measure, morally responsible for the evils resulting from a tacit license to trade in fraudulent and injurious preparations of the commodities of life, and thus show themselves as grossly incapable of discharging the important duties entrusted to their care.

DR. KOLLER, the discoverer of the anæsthetic properties of cocaine, has removed from Vienna to New York City.

PROF. LEIDESDORF, Professor Extraordinary of Psychiatry at the University of Vienna, has resigned in consequence of ill health. He has been a teacher at the University of Vienna since 1857 and chief of the Insane Clinic since 1875.

A NEW kind of enterprise has been developed in New York City, in connection with the starting of a new evening newspaper, by the engagement of a physician residing in one of the poorer quarters of the city to treat sick children whose parents are unable to employ medical attendance. He is engaged for the summer months, when the mortality among infants is especially high, to visit the sick at their homes and also to write articles for the newspaper on the preservation of the health of children.

SOCIETY PROCEEDINGS.

AMERICAN OPHTHALMOLOGICAL SOCIETY.

Twenty-fourth Annual Meeting, held at New London, Conn., July 18 and 19, 1888.

WEDNESDAY, JULY 18TH.—EVENING SESSION.

(Concluded from page 111.)

DR. WILLIAM OLIVER MOORE, of New York, read a paper on

HYSTERICAL BLINDNESS IN THE MALE, WITH A REPORT OF THREE CASES.

Case I.—Male, æt. twenty-five, farmer. Family history good. During past two years, had suffered with nervous symptoms. Did not smoke or drink. In June, 1886, complained of failing vision in left eye. When seen, June 16, according to patient's statement, vision in left eye = 0; right eye normal. Ophthalmoscope showed fundus normal, except a slight notch of opaque nerve fibre near the papilla. Testing with prism and candle gave double vision, as did pressure on one eyeball. The patient was informed that treatment by electricity would cure him in a few days. A strong faradic current was applied, causing the patient to jump from his chair, exclaiming that there already was improvement. In ten days $V. = \frac{20}{XX}$. Emmetropic.

Case II.—Male, æt. twenty-two, student and farmer. Fine looking. History of insanity in the family. Eighteen months before coming under observation, atropia had been instilled by a physician to determine whether or not glasses were required. He thought from the effect of the atropine that he was going blind. He then put on smoked glasses, subsequently bandages and kept in a dark room. He would not open the lids and declared that he was blind. For ten months he kept in a dark room, with covering over the eyes. On examination, the lids were closed, but not by spasm; the cornea clear. $V. = 0$. Ophthalmoscopic examination under ether, normal fundus. Hysterical blindness was diagnosed and a favorable prognosis given. Canthoplasty was then performed. Recovering from the effects of the ether the patient opened his eyes and evidently saw clearly. He was told that the cause of the disease had been discovered and that he would be well in a few days. In two days he was walking around without glasses. Has remained well since.

Case III.—Boy, æt. eighteen. Developed blindness in right eye after a disappointment at school. Normal appearance of eyes. Tests with prisms and colored glasses showed that vision was present. Ether was administered and patient assured that he would be well, and under electricity recovery was rapid.

DR. CHARLES A. OLIVER, of Philadelphia, presented a

DESCRIPTION OF A SERIES OF TESTS FOR THE DETECTION AND DETERMINATION OF SUBNORMAL COLOR-PERCEPTION (COLOR-BLINDNESS) DESIGNED FOR USE IN RAILWAY SERVICE.

It is a well-known fact, both from theoretical and practical standpoints, that many "color-blinds," especially

those of medium gradés, have the power, even by daylight, of differentiating slight variations of shade when placed at the ordinary distance (forty inches) for wool selection employed in the detection and determination of "color-blindness." The writer has been induced, in the hope of overcoming the dangers that might arise from this power, in such important departments as railway, marine and naval service, in which the safety of lives and the protection of property are oft-times solely dependent upon proper recognition of color at great distances, and frequently through the intervention of more or less translucent media, to combine two modifications of his method of color selection with a simplified plan of the former procedure, by which the candidate is placed in the actual position of after-work, and under exactly similar circumstances as during employment. The method is divided into three parts:

First. The selection and registry of a definite number of loose wools from twenty-three pure and confusion match skeins thrown upon a dead black surface at a distance of forty inches.

Second. The selection and registry of the same number of similar reflected colors under various intensities of diffuse daylight stimulus, placed at distances requisite for safety.

Third. The selection and registry of transmitted colors under various intensities of artificial light stimulus placed at distances requisite for safety.

In addition to the advantages shown to refer to this first test alone, the method has the following additional ones: 1. Much faster in time than any other method. 2. The selection of loose wools at a distance. 3. No necessity for an expert except in doubtful cases. 4. Employment of the same character of signals for testing as is used in daily routine. 5. Placing the eye during testing at a distance necessary for future safety. 6. Bringing the eye during testing directly before the true condition of weather experienced whilst it is upon duty. 7. Test and match colors all graduated in proportionate sizes.

DR. OLIVER also reported a

CASE OF EMBOLISM OF THE CENTRAL RETINAL ARTERY.

The patient, a young man, was seen October 5, 1887. Twenty-six hours previously, while slowly walking in the shade, he was suddenly seized with blindness in the left eye. There were no other symptoms, and there had been no previous illness. The right eye was normal. Ophthalmoscopic examination of left eye showed clear media, nerve substance of a gray tint and swelling of the retina. All the retinal vessels were reduced in size. The veins were somewhat contracted, especially toward the nerve entrance. The characteristic cherry spot in the macular region was distinct. There was a small hemorrhage on the disk. Careful physical examination failed to reveal any lesion in other parts of the body. The case was kept under observation for some time, but there was no return of vision, the patient remaining completely blind in the left eye.

DR. H. D. NOYES remarked that the result of autopsies shows that the great majority of these cases are really due to thrombosis and not to embolism.

Adjourned until Thursday morning.

THURSDAY, JULY 19TH.—MORNING SESSION.

DR. SAMUEL THEOBALD reported

A CASE OF DOUBLE CONGENITAL IRIDEREMIA

in a child whose mother exhibited a congenital coloboma of each iris.

James O., aged eighteen months, was seen December 9, 1887. His mother brought him on account of the red appearance which the pupils presented. Upon examination, besides a congenital squint of the left eye, complete absence of each iris was discovered. The lenses were clear and there seemed to be, at least in the right eye, fairly good vision. The interest of the case lies in the fact, accidentally discovered, that there existed in the mother a congenital coloboma of each iris. In her right eye the coloboma was large, its direction being directly upward; in the left eye it was somewhat smaller, and was in an upward and outward direction. In neither eye was the choroid involved in the congenital defect. The mother volunteered the statement that an older child had had a similar appearance of the eyes, so that it is probable that to this mother with congenital coloboma there was born not only one but two children with absence of the irides.

DR. DAVID WEBSTER, of New York, thought that the direction of the coloboma in the mother's eye was unusual. He did not recall an instance in which the coloboma was upward. It is almost always downward.

DR. RANDALL, having had occasion to look up the literature of this subject, said that there were a number of cases reported of coloboma inward or outward but not upward.

DR. T. Y. SUTPHEN, of Newark, N. J., read a paper on

PUNCTURE OF THE RETINA FOR DETACHMENT.

The results of three operations were reported. A male, sixty-two years of age, sought treatment April 1, 1887, for a cloudy appearance before the right eye. This he had noticed only a few days. He was near-sighted, but had never used glasses. Examination, R. S. = $\frac{15}{C}$

raised to $\frac{15}{XX}$ by $-\frac{1}{8}$ +; field of vision defective downward and toward the median line. Tension slightly diminished. L. S. + $\frac{15}{C}$, raised to $\frac{15}{XV}$ + by $-\frac{1}{8}$. Ophthalmoscope showed myopia with choroiditis in both eyes. In the right eye the retina was found detached in its upper and temporal portion. The patient refused to undergo vigorous treatment in bed. He was given iodide of potassium in gradually increasing doses, rest being enjoined.

Five months later the patient returned with commencing detachment in the upper and temporal portion of the left retina. He was then kept in bed for two weeks, with the eyes bandaged, while profuse diaphoresis was frequently induced, but without benefit. He was then sent to the country, the iodide being continued. By December 1st there was in the right eye only perception of light; in the left there was vision confined to the outer and lower field. On this date puncture of the retina from beneath the detachment was made. Thorough antiseptics was employed; cocaine was instilled, a sickle-shaped needle was thrust into the globe between the

insertion of the external and inferior recti muscles, on the equator and on a plane with the lens; it was pushed onward until it was thought that the retina had been pierced. It was then withdrawn with a sweeping motion, the object being to enlarge the opening in the retina. Atropine was instilled, the eyes bandaged and the patient ordered to keep quiet. The following day, the subretinal fluid had disappeared, field of vision was normal, a red reflex was obtained from the fundus in every direction and the patient could distinguish large objects. Bandage was reapplied. Two days later, patient could count fingers at twelve feet, the retina appeared in the normal position, but the vitreous was quite cloudy. The vision continued steadily to improve. December 10th, a similar operation was performed on the left eye. Two days later there was marked enlargement of the field of vision, but some detachment was still to be seen on the temporal side. December 16th, field of vision in both eyes normal. No detachment of retina in either. The patient remained in bed twenty-eight days. February 10th, detachment began to reappear in the left eye and by March 3d it was as great as before. Needling was again performed with the escape of very little subretinal fluid. March 5th, field again normal. April 1st, partial return of detachment in left eye. July 6th, seven months after first operation, S. R. = $\frac{15}{C}$, raised to $\frac{15}{XL}$ by $-\frac{1}{10}$, no return of detachment, field of vision normal, blindness for red. In the left eye, almost complete detachment of the retina.

After referring to the history of the operation, the speaker said that the interesting facts were these: The apparently perfect safety of the operation under modern antiseptics; one success and two failures under exactly similar conditions, barring the escape of the fluid outward in the successful case; encouragement to try this operation in otherwise incurable cases; the absolute freedom from all reaction. The best results will probably follow when the operation follows closely upon the subsidence of the acute affection causing the detachment. The chances of success are increased by a free flow of fluid outward. It was suggested that a narrow Gräfe knife might be used after accurately measuring the depth of the detachment, provided the point be so directed that the wound in the retina shall be directly opposite the lateral puncture.

DR. J. F. NOYES, of Detroit, had tried operative procedure in only one case. He drew off the fluid with a hypodermatic syringe. After drawing off the fluid the retina returned to its normal position, and the outline of a small tumor was discovered. The detachment soon returned; the ball was enucleated one year later.

DR F. P. CAPRON, of Providence, reported

A CASE OF GLIOMA.

The patient was a child three and a half years of age. The growth was removed, but has since involved the submaxillary glands and the glands in the neighborhood of the ear. Photographs showing the appearances were presented.

DR. D. B. ST. JOHN, of Hartford, asked whether aid in the diagnosis between glioma and other affections was afforded by attention to the state of the tension.

DR. DAVID WEBSTER, of New York, had never been able to detect any increase of tension until the second or inflammatory stage had been reached. There is always

increase of tension. In at least two cases he had diagnosed glioma from the history, with the existence of increased tension, when no tumor could be discovered. There is now on record a case in which Dr. C. R. Agnew removed both eyes of a child, one year of age, for glioma. This was fifteen years ago and the individual is still living. In this case the diagnosis was verified by microscopical examination. In some cases in which the diagnosis was made, but enucleation refused, the patients are still alive and the disease has not progressed, retrograde metamorphosis having, it is said, taken place.

DR. W. F. NORRIS believed that in true glioma retrogressive metamorphosis does not take place. Fatty degeneration may occur in parts of the growth, but he was not aware of a case in which the growth entirely disappeared. Such cases are, he thought, instances of mistaken diagnosis. The diagnosis is difficult unless the growth has reached such a size that the vessels may be seen in it.

DR. SWAN M. BURNETT presented some

MODELS EXHIBITING REFRACTION BY CYLINDERS.

It was shown how the refraction and the facial line change with the variation in the strength of the lens and with the alteration of the angle of crossing of their axes. The models were made, at his suggestion, by Mr. C. F. Prentice, of New York. Diagrams were exhibited showing, by geometrical construction, how it was possible to tell the course of any given ray after its refraction by any two cylinders of differing power and at any angle of crossing of their axes. A formula applicable to any axis of crossed cylinders, calculated by Mr. Prentice, was also shown.

DR. EDWARD JACKSON then read a paper on

DESIGNATION OF PRISMS BY THEIR REFRACTIVE POWER.

The author pointed out the inconveniences and errors arising under the present method of designating the strength of prisms, and recommended their designation by their refractive power as much more accurate.

A committee consisting of Dr. H. D. Noyes, Dr. Edward Jackson and Dr. Swan M. Burnett was appointed to take the matter into consideration, and report at the next meeting.

DR. DAVID WEBSTER then read a paper on

EXTRACTION OF A PARTIALLY ABSORBED CALCAREOUS LENS.

March 15, 1888, C. C., æt. twenty-three, consulted Dr. Agnew and the author at the Manhattan Eye and Ear Hospital. She had phthisis bulbi left, and in the right eye were the calcified remains of a mostly absorbed lens, with a discolored atrophic-looking iris attached to the membranous mass by numerous adhesions. Visual field good. V = fingers at two feet. The vision of the left eye had been lost through a blow with a whip at the age of two years. A cataract developed in the right eye some time afterward. Seven years ago (1881), her sight having been lost four months, both eyes were several times operated on by a surgeon in another city. Violent inflammation followed one or more operations on each of the eyes. Eighteen months ago another needling was done by another surgeon, by which sight was somewhat improved. The atrophic eye of late has been painful and tender on pressure. March 16th, Dr. Agnew enucleated the atrophic eyeball. A calcified plate was found in the

choroid and a small calcareous lens. While the patient was still under ether, he performed an iridectomy on the right eye. April 27th, Dr. Webster divided, with Knapp's knife-needle, two or three of the adhesions which were on the stretch. At least one could be heard to snap when cut. An attempt to penetrate the thinnest looking portion of the membranous mass failed. There was considerable effusion of blood, which was soon absorbed. May 14th, an attempt to remove the pupillary obstruction with a sharp hook failed. Very little reaction. June 6th, with a keratome bent on the flat, a wound, as for iridectomy, was made on the supero-nasal corneal border. The pupillary obstruction was drawn out and cut off close to the cornea. Not a drop of vitreous escaped. There was some pain in the eye for three or four hours, probably the reaction from cocaine. Four days later, pain again appeared and was relieved by iced cloths. June 18th, fundus normal, no floating bodies in the vitreous, but the remaining portion of the pupillary membrane, which, by the way, was very thick and so tough that the iris scissors would scarcely cut it, extended backward horizontally and flapped up and down with the movements of the eye. June 22d. V = $\frac{20}{XX}$ with $-\frac{1}{37}$. Reads

Jaeger No. 1, with $+\frac{1}{2\frac{1}{4}}$. June 26th, discharged, wearing the above lens.

DR. S. THEOBALD exhibited an

UNUSUALLY LONG CILIUM.

The hair was over an inch in length, and was removed from the eyelid of a young lady suffering with some conjunctival irritation; the other cilia were of the usual length.

OFFICERS FOR THE ENSUING YEAR

were elected as follows:

President.—Dr. Wm. F. Norris, of Philadelphia.

Vice-President.—Dr. Hasket Derby, of Boston.

Treasurer.—Dr. J. S. Prout, of Brooklyn.

Recording Secretary.—Dr. Samuel B. St. John, of Hartford.

It was decided to hold a special meeting for the consideration of scientific matters only, September 19, 1888, at the Arlington Hotel, Washington, D. C.

The regular annual meeting will be held on the third Wednesday in July at the Pequot House, New London, Connecticut. Adjourned.

PHILADELPHIA COUNTY MEDICAL SOCIETY.

Stated Meeting, June 12, 1888.

C. B. NANCREDE, M.D., IN THE CHAIR.

DR. JOHN S. MILLER read the following paper:

A CONTRIBUTION TO THE STUDY OF BONE REPAIR.

The recent observations of Macewen¹ have done much to stimulate the study of bone repair and have not thrown a little light upon the function of the medullary cells in osteogenesis.

The resort to mechanical irritation of the medullary tissues as a means of accelerating bone repair is an old procedure. Nancrede² claims a priority in this for

America. As far back as 1793, Eve¹ relates that the lay surgeons of the frontier were wont to make multiple perforations of the external table of the skull when necrosis followed the Indian mutilation of scalping; and twenty years ago Agnew resorted to the same procedure in a case of injury to the head. A fatal termination of the case, however, by encephalic complication, rendered the experiment incomplete. Reports of success by this procedure have been recently multiplied to an extent which will excuse us from repeating them in detail.

That furthermore, medullary proliferation is not only an element in osteogenesis, but is of itself sufficient to that end, without periosteal coöperation, is evidenced by the case of Macewen,² in which a considerable restoration of the humerus was secured "by bone-transplantation," after a suppurative inflammation had destroyed both the shaft and its periosteum. The date of this observation is 1878.

The patient was a boy, two years of age. A suppurative periostitis of the right humerus of nine weeks' duration had resulted in total necrosis of the entire diaphysis, and this latter had been removed, leaving a tube of granulation material lining the periosteum. This tube had been kept patent by suitable dressing, until the whole space had become filled with granulation tissue, and had finally become a mass of cicatricial tissue. No bone had grown from this periosteum, except from a small portion next the proximal epiphysis, where at the outset the periosteum had been found covered with plaques of adherent osseous tissue. In the remainder there had been no osseous deposit, the result being a flail-like arm, which the patient found so useless that the parents desired its removal.

Macewen determined, however, upon another procedure. An incision was made into the upper third of the arm, exposing the head of the bone, to which was found attached a spike-like process of cartilage. This was removed, leaving as remains of the diaphysis a portion of bone one and three-fourths inches in length. From this point a sulcus about two inches in length was made in a downward direction between the muscles. The former presence of bone was nowhere indicated, there was no vestige of periosteum, and the sole guide as to the correct position into which the graft was placed was an anatomical one. Two wedges of bone were then removed from the tibia of a patient aged six years, with anterior curves. The face of the osseous wedges consisted of the anterior portion of the tibia, along with its periosteum, the wedges gradually tapering toward the posterior portion of the tibia.

After removal they were cut into minute fragments with the chisel, quite irrespective of the periosteum. The larger number of the fragments had no periosteum adhering to them, having been taken from the interior of the bone.

They were then deposited in the muscular sulcus of the boy's arm, and the tissues drawn over them and carefully adjusted. The wound healed without pus production. Two months after, a portion of bone an inch in length and three-quarters of an inch in thickness was found firmly attached to the upper fragment of the humerus.

Two other wedges of bone, larger in size, were similarly dealt with and inserted two months subsequently to the first graft, and a third couple were placed in position five months after the first. These filled up the gap in the arm to the extent of four and one-quarter inches. The arm then measured six inches in length.

¹ Annals of Surgery, vol. vi. pp. 289 et seq., 389 et seq.

² Internat. Encycl. of Surg., by Ashhurst, vol. v. p. 8.

¹ Remarkable Cases of Surgery, p. 35. Philadelphia, 1857.

² Loc. cit., p. 301.

Soon the utility of the arm was greatly restored. Seven years afterward he was seen and examined. The shaft of the humerus was found to have increased in length by one and three-quarters inches, being then seven and three-quarters; and it had increased in circumference to a marked extent and assumed a somewhat irregular shape. The length of the sound arm had, however, considerably outstripped the length of the engrafted humerus. The boy could use the arm for many purposes—taking his food, adjusting his clothes and in many games.

Whether the introduction of proliferating medullary cells into ordinary connective tissue granulations may convert the whole into osseous tissue, or whether a few osteoblasts will, so to speak, leaven the whole mass, is a question involving grave doubt, but the affirmative would seem to receive some support from the case which Nancrede¹ relates in 1883. An extensive laceration had caused denudation and necrosis of the ulna in two-thirds of its extent. The process of repair had been delayed; the operator drilled numerous holes through the sequester into the medullary canal, and, to quote his own words, "in a few days granulations sprang up from the ulna and fused with the granulations of the soft parts, and, in course of time, the fragment was separated."

That the procedure in this case had the effect of stimulating osteogenesis from within we can readily believe; but concerning the fusion with granulation tissue without, a more accurate observation than is recorded by Nancrede is desired. Although by analogy we might conceive it possible, inasmuch as repair within the bone is by ossification of an embryonic tissue derived from the connective tissue around the bloodvessels of the medullary space. A similar case is reported by Macewen,² in which granulations appeared upon a surface of bone completely denuded of its periosteum and gradually spread until they became united with the granulation tissue at the periphery of the wound. Macewen, however, infers from this observation that "The periosteum covering a bone may be completely destroyed or permanently removed, yet the denuded bone may not only retain its vitality, but may throw out cells which will cover it and form a new periosteum."

The presence of these cells would seem to confirm Macewen's dictum that the periosteum has no part, whatever, in the regeneration of bone; but the following case demands a different hypothesis for its explanation:

D. M., aged fourteen years, suffered from an osteomyelitis of the right tibia, resulting in total necrosis of its diaphysis. A complete involucrum had formed around the sequester and afforded an unsteady support for the body weight. It was covered with the thickened periosteum. A number of fragments had been removed from time to time, and the parents had refused to entertain for him the proposal of amputation. The case, however, when it came into my hands, had from septic infection become so desperate that I was compelled to do something radical at once.

Exposing the shaft, or rather the involucrum, throughout its whole length, Dr. Miller made, with trephine and saw, a fenestrum large enough to permit the removal of the remaining sequestra and cleared out the whole canal. Both epiphyses were found carious upon their exposed surfaces and were scraped to the limit of safety. In a

few days a superficial necrosis took place upon the inner surface of the tube.

Demarcation was, however, promptly effected by the free use of aluminium acetate—

R.—Pot. et alum. sulph. 1 part.
Plumb. subacet. 5 parts.
Aque bull. 100 parts.—M.
Filt.

and a layer of fine granulations became the field for any osteogenesis which we might hope to witness. During the long process of repair, with the carious epiphysis as a never-failing source of bacterial supply, it was no trifling task to keep this extensive opening dry and sterilized. Furthermore, frequent dressings caused great nervous prostration.

The requirements of the case were successfully met by a mixture of iodoform and starch, in proportions which varied with the changing conditions. The cavity of the wound was filled with this dry powder, and to the whole was applied a closed dressing of gutta-percha tissue. The purpose of the starch was to absorb the excess of moisture incident to a closed dressing, as well as to dilute the iodoform. As soon as the powder became saturated, it was removed by a stream of sterilized water, and the wound was filled and closed as before. The intervals of dressing were gradually increased from three to ten days. These details are given, because, without them or similar ones, we would wait in vain for the desired repair. In process of time the hollow of the involucrum became completely filled with granulation tissue, which continued to extend until it fused with the granulations from the soft parts, and, finally, the whole became covered with a new epithelium, which had gradually spread from the edges of the wound. The tissues now became denser and offered more and more support to the body weight, until, as may now be seen, the boy has acquired a very useful limb and can walk without discomfort.

We must, therefore, infer that a metamorphosis into bone has taken place, and as the original diaphysis with its medullary structure is gone, we can find no osteogenic agent in the result other than the periosteum.

We must draw a similar conclusion from the recent case reported by Ceci: The patient, a young man, developed an acute osteomyelitis of the left scapula five days after circumcision for inflamed phimosis. One month later, Ceci¹ extirpated the bone, making the usual L-flap. The periosteum was left intact as far as possible, and the arm was preserved. The patient recovered rapidly, and there was a subsequent regeneration of the bone.

The only possible explanation of this result is by the hypothesis of periosteal agency or coöperation.

The following case is in confirmation of Macewen's proposition that "A portion of bone which has its continuity severed on all sides and has had all its periosteum removed is capable of living and growing." This is in contradiction of our inference in the case of the tibia and can be reconciled only by the assumption that the discovered laws of osteogenesis are of a lower order, subject to some general law of which we are as yet ignorant.

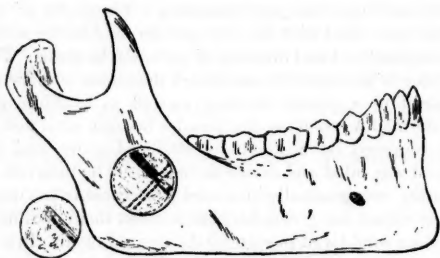
Mrs. L., aged forty-seven years, had suffered with a neuralgia of the maxillaris inferior, for the relief of which all medical means had been exhausted in vain, and

¹ Transactions of the Philadelphia Academy of Surgery, 1888.

² Loc. cit., p. 293.

¹ Centralbl. f. Chirurgie, Dec. 17, 1887.

which, therefore, left to Dr. Miller's option only the *derrier resort* of neurectomy. The mode of operating was the usual one. The ramus was trephined near the angle of the jaw, the canal was exposed, and about two inches of the nerve trunk were drawn out and excised. The button was, however, returned after having been sterilized in a 1 to 1000 solution of corrosive sublimate, but it was not returned to its old position. With a view of imposing a barrier to the reproduction of the nerve, it was so rotated around its vertical axis that the groove upon its under surface stood at right angles to the axis of the canal. Not only did the wound close by first intention, but the button grew solidly in its position. Now, the curious thing in this case is, that before trephining he had carefully removed the periosteum, so that the latter can claim no part in the subsequent bone repair. After seven months there has been no return of the disease.



DR. JOHN B. ROBERTS said that it is a curious fact that the medical mind has not appreciated the possibility of bone production, despite the frequent instances that must always have come under notice. He was taught in cases of comminuted fracture, to take out the spicules of bone that were entirely separated from the larger fragments, lest they should necrose and give rise to trouble. Now it is the practice of the best surgeons to leave the spicules, and we find that often they do not die, and that they assist in the process of union and solidification. This experience is in the same line as the facts given by Dr. Miller in connection with his interesting case. If these spicules of bone can reunite, why not the button removed by trephining? Why is it not good practice to insert, when necessary, a portion of dog bone or chicken bone? as, indeed, has been done. We must not forget, however, the importance of asepsis, and that it is anti-septic surgery that has made these procedures possible.

In a case such as Dr. Miller reports, in which he rotated the button of bone, turning the groove in which the inferior dental nerve had run at right angles to its former direction, he should be inclined to go still further, and turn it upside down. The bottom of the pit in which it is to be placed, and the periosteal surface of the button being scraped, the ungrooved, freshened surface, formerly external, would then be placed inward, and a bony plug would be interposed between the divided ends of the nerve, probably preventing the reunion and the return of pain which so often occur.

The case of tibial resection was very interesting to him, as he had recently operated upon a similar one; the patient being, however, a woman of about fifty years, so that he cannot hope for as complete a closure of the cavity in the bone as in this growing child, exhibited by

Dr. Miller. In that case, he removed the whole front of the tibia, going as near the articular cartilages above and below as he dared. The process of repair was like that we see in trees. We know that if a foreign body is inserted into a wound made in the trunk of a young tree, the process of cell growth will go on about it, and finally it will be completely covered in, and the presence be unsuspected, until, perhaps, the saw strikes it, as the tree is being converted into lumber.

DR. GEORGE E. STUBBS said that, in regard to operative treatment of neuralgia, we are entering upon a stage of work that will be much enlarged in the near future. He had a case recently in which neuralgia of the inferior dental nerve had existed for nearly seven years. He removed one and three-fourths inches of bone with the dental engine, took out as much of the nerve as he had access to and dressed and treated the wound antiseptically. The wound healed by first intention, and as yet there has been no return of pain; so that he considers he has obtained a very good result.

DR. NANCREDE said that the first question to be answered in a discussion of this kind is, What constitutes the periosteum? If we mean a fibrous membrane, the inner layer of which consists principally of yellow elastic tissue, then we must agree with Macewen's extreme views and admit that it has nothing to do with bone repair; but if we study the normal process of bone development, he, at least, must arrive at a different conclusion. The long bones are laid down in cartilage, a temporary structure. How do they ossify? By means of this very periosteum, which Macewen treats with such contempt, and which Ollier exalted too highly. There is a third layer of the periosteum in direct contact with the bone, and this layer is composed entirely of those elements which, wherever we see them, we recognize as the agents of ossification—the osteoblasts. The temporary cartilage is invaded by connective tissue ingrowths from the periosteum, covered with osteoblasts, and is eaten up by them; and we find it permeated and finally replaced by a network of fibrous tissue covered with osteoblasts. A certain number always remain beneath the periosteum. A certain number, very small, remain in the Haversian canals, a still larger number in the medulla.

It is clear to him why compact tissue dies; it has so few osteogenetic cells. The medullary tissue lives because it is comparatively rich in osteogenetic elements. Why does bone die when the periosteum is stripped off? Because the resulting inflammation is so severe that the inflammatory tissue strangulates the osteoblasts in the Haversian canals. With antiseptic means we now control the inflammation, and the osteoblasts are not killed, and the bone is saved.

We are very hard, nowadays, on the periosteum. The fibrous layer has nothing to do with bone repair, but its osteoblastic layer is in direct communication through the lining of the Haversian canals with the medulla; it is practically one structure; and thus, if we look at this matter from the standpoint of a correct histology, we find that both views are correct, provided only that we have a distinct understanding as to what is meant by the word periosteum in each case.

As to Dr. Miller's case, he cannot quite agree with him as to what formed the bone in the case of total excision of the diaphysis of the tibia. While the shaft was dying, new bone was formed by the deep layer of periosteum,

but after that the medullary spaces of the involucrum completed the bone.

He would also take exception to Dr. Roberts's proposition to scrape the button of bone and turn it inside out, in the case of trephining the jaw for neuralgia. By this process he would remove all the osteoblastic cells, and the compact tissue would have a very good chance of dying. One reason for failures in operations about the lower jaw is that it contains so little true medullary tissue, while, on the contrary, we can replace trephine buttons in the skull and have union, because the skull contains a large amount of such tissue.

The case of Dr. Agnew, referred to in the paper, occurred some twenty odd years ago. He saw the operation. The wound was completely covered by granulations. The fact that a denuded external table did not always necrose was known to Potts and to all the older as well as modern surgeons, and if Ollier had not led us astray by grafting, by insisting upon the periosteum being the sole osteogenetic agent, ignoring the fact that in removing it a layer of cells identical with those of the medulla are torn off, we would have arrived at a correct practice sooner; but surgeons went wrong by authority of Ollier, as they are now going wrong in the other direction by authority of Macewen.

In regard to the implantation of dead teeth, which Dr. Roberts referred to, the principle is probably the same as in the bony pegs formerly employed for ununited fractures. They are hollowed out by the granulation tissue, which develops into a fibrous or even osseous tissue and so holds the tooth in place by these newly formed digitations.

About twelve years ago he exhibited to this Society a case in which he resected four and a half inches of the humerus, and about two and a half inches were reproduced from the sawn end. This was without antiseptis. In the case referred to by Dr. Miller, in which he drilled the ulna, he was sure that the bone granulations fused with those of the soft parts for these reasons: the shell of bone when detached was not more than one-fourth the thickness drilled through, while the new bone was nearly as thick as the ulna of the other other side, as the cicatrix was not materially depressed. A recent experience, in a case of knee-joint excision, induced him to recommend that instead of wiring fragments of bone we nail them together, after having previously drilled or not, according to circumstances, allowing the heads of the nails to project through the skin. We thus save trouble and avoid damage in the removal.

DR. ROBERTS said that Dr. Nancrede misunderstood him in regard to scraping away the cancellated tissue in reversing the plug in the case of trephining the lower jaw. He would scrape only what he calls the fibrous periosteum from the button, and from the bottom of the pit in the jaw he would take away the cancellated structure sufficiently to remove all trace of the nerve canal. The two raw surfaces would be placed together, and, by sinking of the button, would be a solid bony plug, interposed between the nerve ends.

DR. MILLER did not see any advantage in reversing the plug over rotating it. The groove being at right angles to the course of the nerve, the part in contact with the nerve is still solid bone, and the groove does not matter at all. In relation to the tibia case, the reason he emphasized the fact that the repair took place from

the periosteum is because there was entire death of the old bone with the involucrum, and the periosteum did not die.

CORRESPONDENCE.

A VALUABLE REMEDY FOR CHRONIC DIARRHŒA.

To the Editor of THE MEDICAL NEWS,

SIR: I think you would do a service if you would call attention in your journal to a valuable remedy for chronic diarrhœa.

Many years ago I suffered severely from that trouble; I considered it incurable. Being in Paris, one of the best physicians there assured me it could be cured by a diet of racahout, and it was.

Afterward here I found one could not get the acorn meal that forms the active part, but knowing that its usefulness must depend on the tannin it contains, I tried substituting it as follows:

Powdered chocolate, pure	. . .	$\frac{1}{2}$ lb.
Rice flour	. . .	$\frac{1}{2}$ "
Powdered sugar	. . .	$\frac{1}{2}$ "
Tannin	. . .	$\frac{1}{4}$ oz. (120 grs.)

The tannin, or the rest, separately, have little effect. Together they restore the tone of the alimentary canal and nourish as well as cure.

One thing is *essential*, that is long cooking, not less than half an hour. If simply boiled a few minutes, the harsh taste of the tannin is very strong; with a good half hour's cooking, it disappears *wholly*—it is impossible to distinguish the medicine from ordinary broma. I think this has something to do with its curative powers and with the ease of digestion by the most irritable stomach. The remedy is too valuable not to be more widely known.

The amount to be taken is a teacupful morning and evening at meals.

Very truly yours,

M. C. L.

NEWS ITEMS.

The Harvard Medical School.—In addition to the existing requirements for the third-year degree, each candidate will be obliged to take examinations from a list of elective studies, to be chosen at the commencement of the year. He may choose to pass an examination of two hours in either of the following subjects: dermatology, diseases of the nervous system, diseases of children or gynecology; or he may pass two examinations, of one hour each, in any two of the following subjects: ophthalmology, otology, mental diseases or legal medicine.

Dr. T. M. Rotch has been appointed Assistant Professor of Children's Diseases.—*Boston Med. and Surg. Journal*, July 26, 1888.

The Expenses of the International Medical Congresses.—EWALD, in the *Berlin. klin. Wochensch.*, July 9, 1888, in a brief historical sketch of the International Medical Congresses which have been held, prepared for the use of the Committee on the Organization of the Berlin Congress, concludes with the following statistics of the last four meetings:

Congress.	Members.	Printing, including Transactions.	Receipts from registration.	Government appropriations.	Private subscriptions.	Total cost of the Congress.	Cost per capita.
1879. Amsterdam	630	\$1,875.00	\$2,330.00	\$1 040.00	\$2,375.00	\$5,775.00	\$9.16
1881. London	3181	16,000.00	16,466.75	28,620.00	43,695.00	13.73
1884. Copenhagen	1400	5,650.00	7,062.00	14,125.00	14,075.00	18,362.50	13.30
1887. Washington	2500	18,400.00	31,696.00	10,000.00	12,054.75	54,125.00	21.65

At London a guarantee fund of \$5750 was raised, but not used.

These figures are not absolutely accurate, but they are approximately correct, and show how the expenses of the Congresses have grown, and they afford a basis of comparison for other meetings.

The Royal College of Physicians.—On the 27th of June, the President of the Royal College of Physicians, Sir Andrew Clark, received a large and distinguished company in the hall of the College. An interesting collection of works of art and curiosities was on view for the entertainment of visitors. Especially interesting to medical men, who, of course, formed the great majority of the gathering, was the diploma of Harvey, the discoverer of the theory of the circulation of the blood. It was from the University of Padua, and is dated April 25, 1602. There were also a manuscript book in the handwriting of Jenner, a number of relics of Dr. Priestley, many autographs of medical celebrities and some scientific exhibits. The band of the Royal Artillery, under the Cavaliere Zaverl, played a selection of popular music during the evening.—*Lancet*, July 7, 1888.

A New Breast Pump.—Auvard has invented a new breast pump, described by recent French journals, which consists of a glass bell fitting over the breast, from which a tube goes to the child's mouth, and a second and larger tube to the mouth of the mother. The mother aids the child by performing suction simultaneously with the child.

Berlin Druggists and Bogus Prescriptions.—It is said that a Berlin society sent out a long series of bogus prescriptions, containing, for example, "tuber cinereum," "urticaria rubra," "pemphigus foliaceus." These things were dispensed and paid for in over sixty Berlin drug stores.—*Brooklyn Med. Journal*, June, 1888.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM JULY 31 TO AUGUST 6, 1888.

MAGRUDER, D. L., *Surgeon* (U. S. Army).—Is granted one month's leave of absence, to take effect on or about August 13, 1888.—Par. 11, S. O. 171, A. G. O., July 25, 1888.

WOLVERTON, WILLIAM D., *Major and Surgeon* (U. S. Army).—Is relieved from duty at Washington Barracks, District of Columbia, and ordered to duty at Fort D. A. Russell, Wyoming Territory.—Par. 13, S. O. 173, A. G. O., July 27, 1888.

GARDNER, WILLIAM H., *Major and Surgeon* (U. S. Army).—Is relieved from duty at Fort McHenry, Maryland, and ordered to duty at Washington Barracks, District of Columbia.—Par. 13, S. O. 173, A. G. O., July 27, 1888.

CALDWELL, DANIEL G., *Major and Surgeon* (U. S. Army).—Is relieved from duty at Fort D. A. Russell, Wyoming Territory,

and ordered to duty at Jefferson Barracks, Missouri.—Par. 13, S. O. 173, A. G. O., July 27, 1888.

WHITE, ROBERT H., *Surgeon* (U. S. Army).—Is relieved from duty with the Battalion of the First Infantry, at Santa Barbara, California, and will proceed to Angel Island, Cal., on public business, on the completion of which he will stand relieved from duty in this Department.—Par. 4, S. O. 43, *Headquarters Department of California*, July 17, 1888.

MUNN, CURTIS E., *Assistant Surgeon* (U. S. Army).—Will proceed to Santa Barbara, California, and report for duty to the commanding officer of the First Battalion of Infantry.—Par. 3, S. O. 43, *Headquarters Department of California*, July 17, 1888.

BYRNE, CHARLES B., *Captain and Assistant Surgeon* (U. S. Army).—Is relieved from duty at Washington Barracks, District of Columbia, and ordered to duty at Fort McHenry, Maryland.—Par. 13, S. O. 173, A. G. O., July 27, 1888.

COCHRAN, JOHN J., *Assistant Surgeon* (U. S. Army).—Will proceed to Benecia Barracks, California, on public duty, on completion of which he will return to these Headquarters.—Par. 1, S. O. 44, *Headquarters Department of California, San Francisco, Cal.*, July 20, 1888.

EWING, CHARLES B., *First Lieutenant and Assistant Surgeon* (U. S. Army).—Is relieved from duty at Fort Lewis, California, and ordered to duty at Washington Barracks, District of Columbia.—Par. 13, S. O. 173, A. G. O., July 27, 1888.

JARVIS, N. S., *Assistant Surgeon* (U. S. Army).—Is granted one month's leave of absence on surgeon's certificate of disability, with permission to go beyond the limits of the Department.—Par. 1, S. O. 90, *Headquarters Department of the Missouri*.

JOHNSON, HENRY, *Captain and Medical Storekeeper* (U. S. Army).—Leave of absence granted for one month and fourteen days, from August 1, 1888.—S. O. 170, *Headquarters of the Army, A. G. O.*, July 24, 1888.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF THE MEDICAL CORPS OF THE U. S. NAVY, FOR THE WEEK ENDING JULY 28, 1888.

PENROSE, THOMAS N., *Surgeon*.—Detached from the Navy Yard, Boston.

PARKER, J. E., *Surgeon*.—Ordered to the Navy Yard, Boston.

MCCORMICK, ALBERT MCD.—Commissioned Assistant Surgeon in the Navy.

OFFICIAL LIST OF CHANGES OF STATIONS AND DUTIES OF MEDICAL OFFICERS OF THE U. S. MARINE-HOSPITAL SERVICE, FOR THE TWO WEEKS ENDING JULY 28, 1888.

MURRAY, R. D., *Surgeon*.—To proceed to Manatee, Florida, on special duty, July 21, 1888.

WASDIN, EUGENE, *Passed Assistant Surgeon*.—To proceed to Key West, Florida, for temporary duty, July 21, 1888.

FATTIC, J. B., *Assistant Surgeon*.—To proceed to Memphis, Tenn., for temporary duty, July 28, 1888.

WOODWARD, R. M., *Assistant Surgeon*.—When relieved, to proceed to Boston, Mass., for duty, July 24, 1888.

GOODWIN, H. T., *Assistant Surgeon*.—When relieved, to proceed to Cincinnati, Ohio, for duty, July 24, 1888.

GUIERAS, G. M., *Assistant Surgeon*.—Appointed an Assistant Surgeon July 23, 1888. Assigned to duty at the Marine Hospital, New Orleans, La., July 24, 1888.

HUSSEY, S. H., *Assistant Surgeon*.—Appointed an Assistant Surgeon July 23, 1888. Assigned to duty at the Marine Hospital, Baltimore, Maryland, July 24, 1888.